A SETTLEMENT PATTERN ANALYSIS OF PREHISTORIC SITES IN MAMMOTH CAVE NATIONAL PARK, KENTUCKY

By

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A DISSERTATION PRESENTED TO THE GRADUATE SCHOOL
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

UNIVERSITY OF FLORIDA

1994

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ACKNOWLEDGMENTS

This study is the result of the hard work of many individuals and institutions, whose efforts and contributions extended over three years of field work and four years of analysis. I am deeply indebted to all of those persons who in one way or another participated in the Mammoth Cave National Park Archeological Inventory Project.

I would like to thank the following Mammoth Cave National Park staff for their help and cooperation during the three field seasons at the Park: Frank Pridemore, Park Superintendent (1987); David Mihalic, Park Superintendent (1988-1989); Phil Valuzet, Chief Ranger; Joe Wagoner, Chief Park Interpreter; Steve Chaney, Chief of the Office of Science and Resource Management; Bob Ward, Cultural Resource Management Specialist; Jim Waddle, Assistant Chief Ranger; Henry Holman, Park Ranger; Ken Kern, Park Ranger; Maxwell Vincent, Park Ranger; Conley Armour, Park Ranger; George Gregory, Natural Resource Specialist; Royce Vincent, Roads and Trails Foreman; Frank Garrison, Administrative Officer; Kenneth Logsdon, Ferry Operator; and Leroy Childers, Ferry Operator.

I also wish to express my appreciation to Kenneth S. Wild, field crew chief (1987), and Bruce L. Manzano, lab and field crew chief (1987-1989), for their support and hard work and their friendship. Ken and Bruce were able

to rise above the adversities of working far away from home and for a supervisor who expected only the best from his crew chiefs. Bruce, especially, was a constant support, working long hours and giving of his own free time to pursue archaeology in the Mammoth Cave area. The Project and I benefitted greatly from Bruce's efforts.

I would like to thank the various crew members for their hard work in the field and lab during the Project: Tina Bassett (1987), Chris Begley (1987), Joanna (Jody) Carter (1989), George (Ray) Frye, Jr. (1988), Gerald Furgeson (1987), Mark D. Groover (1989), Jeff Johnson (1988), Kristin Koehn (1987), Cindy Livingston (1987), Marie (*nee* Mathison) Prentice (1987-1988), Ray Tubby (1987), Doug Welsh (1987-1989), and Elyse White (1987).

By their analytical expertise, certain individuals made the artifact identifications and interpretations presented here possible, and for that I am greatly indebted. Bruce L. Manzano supervised the artifact analysis, identified the bulk of the lithic materials, and performed the faunal analysis. Marie C. Prentice analyzed the historic ceramics. Douglas R. Welsh and Douglas T. Potter performed the bulk of the prehistoric ceramic analysis. Chris Gremillion performed the floral analysis. David Midyette analyzed the human skeletal elements.

During the course of pursuing Mammoth Cave archeology, I was fortunate enough to meet and work with a extraordinary cadre of archeologists who shared their knowledge of Green River archaeology and their friendship.

They are Kenneth Carstens, Berle Clay, Phil DiBlasi, Christine Hensley, Kenneth Tankersley, Valerie Haskins, and Patty Jo Watson.

I would also like to thank Dr. Lawson Smith of the Army Corps of Engineers for sharing his expertise and interpreting the geomorphological history of the Old Mammoth Cave Ferry and Mammoth Cave Ferry #2 sites. Lawson took the time out of his busy schedule to help an old FAI-270 worker, and I greatly appreciate it.

The staff and fellow co-workers at the Southeast Archeological Center provided the administrative support needed to carry this project through. The assistance of Richard D. Faust, George S. Smith, Roy W. Reaves III, Robert Wilson, Dennis Finch, Wilma Clark, Judy Hatten, Chris Harrell, Lois Cutler, and Janice Burke is much appreciated.

During my studies at the University of Florida, I interacted with a number of individuals who helped me develop as a scholar and as a human being, among them: Dr. Patricia Essenpreis, Dr. Art Hansen, Dr. Jonathon Leader, Steve Kryszton, Dr. Paul Magnarella, Dr. William Marquardt, James McKay, Dr. Jeffery Mitchem, Dr. Michael Moseley, Dr. Theron Nunez, Jr., Claudine Payne, Dr. Barbara Purdy, Irv Quitmeyer, Dr. Prudence Rice, Dr. Brenda Sigler-Eisenberg, Dr. Greg Smith, Dr. Marvin Smith, Dr. David Suggs, Christa Wilson, Robert Wilson and Dr. Elizabeth Wing. To these individuals, and any others I may have overlooked here, I offer my warmest regards.

Dr. Jerald T. Milanich, the chair of my committee, has allowed me the freedom to pursue my personal interests in archaeology, tempering my ideological Marxist tendencies with his positivist Cultural Materialist perspectives. For his support and friendship I am sincerely grateful.

My father and my mother have always been supportive of my desire to be an archeologist, even though I'm sure they think I should have put my talents to better use, like becoming a dentist. I hope they are half as proud of me as I am of having them as parents.

My wife Marie has borne the burden of marriage to a "workaholic" who sometimes needs to be told that there are some things more important than archaeology. To her I dedicate this work and my love.

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Abstract of Dissertation Presented to the Graduate School
of the University of Florida in Partial Fulfillment of the
Requirements for the Degree of Doctor of Philosophy

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By

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April 1994

Chairman: Dr. Jerald T. Milanich
Major Department: Anthropology

This study is an attempt to analyze prehistoric site settlement patterning from an economic perspective that includes social, technological, environmental, and ideological variables among the parameters affecting human site selection processes. The research area, encompassing roughly 21,000 hectares (52,000 acres) of floodplain, bluffline slopes, and uplands bordering the Green River in south-central Kentucky, has been studied previously by several archeologists, providing a solid basis for undertaking a comprehensive prehistoric settlement pattern analysis. The present study takes advantage of the new technology of computerized geographic information systems (GIS) to assess the resource potential of several site catchment areas, then evaluates prehistoric site selection and economic processes in relation to

potential resources and archeologically identified resource use. The results of these analyses indicate a very consistent prehistoric utilization of the resources in the research area for 3000+ years, a pattern which reflects seasonal shifts in resource availability and exploitation over a very large settlement area and the persistence of economic systems, which include the exploitation of both wild and domesticated resources.

INTRODUCTION

Archaeology by its very nature is concerned with the study of the spatial distributions of sites, artifacts, and other features resulting from past human behavior. It is these spatial distributions that provide "archaeological context," the primary basis for interpreting the archaeological record. Indeed much of the theoretical discussions in archaeology within the last 15 years have dealt with that area known as "Middle-Range Theory" (e.g., Binford 1977; Schiffer 1976; Butzer 1982), which is concerned with the theoretical basis for interpreting the spatial relationships found in the archaeological assemblage.

Archaeologists are generally interested in studying two types of spatial relationships: human-land relationships, and human-human relationships (Roper 1979; Crumley and Marquardt 1987). The importance of understanding these spatial relationships in archaeological studies is underscored by the number of analyses focusing on settlement distributions in terms of site hierarchies (e.g., Steponaitis 1978; Fowler 1974, 1978), site catchment models (e.g., Roper 1979; Vita-Finzi and Higgs 1970), optimal foraging theory (e.g., Jochim 1976; Winterhalder 1987), and exchange models (e.g., Renfrew 1977; Earle and Ericson 1977; DeGarmo 1977). All of these studies fall within the more inclusive domain referred to as settlement pattern analysis.

Although the theoretical perspectives and purposes among these various studies have differed to greater or lesser degrees, all of them have assumed some aspect of economic function in the development of these models. Whether explicitly stated or ambiguously implied, settlement pattern analysis has always been predicated on the assumption that economic behavior, in part or *in toto*, affects the way in which humans distribute themselves across the landscape (cf. Trigger 1968; Johnson 1977; Clarke 1977; Jochim 1979).

This study examines the settlement patterns exhibited by precolumbian Native Americans who resided in Mammoth Cave National Park located in what is now south-central Kentucky. The assumption that economic decision-making was a principal factor affecting site selection processes by prehistoric peoples in Mammoth Cave National Park is basic to this study. Succinctly put, the current study concludes that the precolumbian settlement patterns exhibited in the study area largely reflect decision-making by individuals who were concerned with minimizing production efforts while pursuing a particular mode of subsistence. While it is clear that other economic and non-economic factors have affected the distribution of sites in the present study area, the current study will focus primarily on how economic human-land relationships have been manifest in the precolumbian settlement patterns exhibited at Mammoth Cave National Park.

In the course of studying human-land relationships exhibited at Mammoth Cave National Park or any other study area, the analyst must be

concerned with both cultural and natural factors. Human perceptions of the environment and consequently human behavior are moderated by the cultural perspectives of the decision-makers (cf. Prentice 1986a; Crumley and Marquardt 1987). How individuals perceive their environment and decide which economic possibilities are to be pursued are concerns, therefore, of the archaeologist, anthropologist, geographer or other analyst interested in human-land spatial relationships.

Several years ago, I (Prentice 1986a) called for a focus on the individual as the basis for studying past human behavior and for modeling social change. In adopting this view, I agreed with three main arguments put forth earlier by Hodder (1982a, 1982b, 1982c, 1985): that the individual is the basis of social change because it is at the individual level that decision-making behavior occurs, that decision-making within societies is variable and constantly being renegotiated by the individual, and that decision-making occurs within a structural (cultural) context and is therefore patterned by society. This position regarding the nature of individual decision-making, coupled with the Marxist viewpoint that the analysis of the mode of production offers the best possibility of understanding social structures (Marx 1904, 1976; Bloch 1975; Godelier 1972, 1973, 1980a, 1980b; Harris 1968, 1979; Kahn 1978; Meillassoux 1972; O'Laughlin 1975; Terray 1972), forms the theoretical basis for my approach to modeling past economic behavior and, in turn, modeling the precolumbian site selection processes exhibited in the Green River area.

From an archaeological perspective, studying individual economic behavior is, at best, an extremely difficult task. This is because the ability to match specific behaviors with specific individuals in the archaeological record is very limited. It is the usual anonymity of the individual in archaeology which makes difficult the direct application of the theoretical tenets to which I subscribe. This does not, however, prevent the application of these basic theoretical propositions, particularly when one moves to the next behavioral scale of archaeological analysis: the individual household.

In non-state societies, members of individual households organize and perform the majority of the economic tasks necessary for the livelihood of all the individuals within the household, as well as the support of the political and religious structures of the greater society. Archaeologists and anthropologists have often employed terms like "subsistence economy" to categorize what is perceived to be the primary characteristic of those non-state societies with economic systems dominated by production and consumption at the household level. Often this categorization is accompanied by the designation "self-sufficient" (Hudson 1976:205; Muller 1984; Smith 1978:494; Pauketat 1989:290). Many archaeologists have accepted this as an appropriate categorization for precolumbian Southeastern societies since the majority of living and active individuals in non-state societies typically produce and consume the majority of the basic material requirements of their existence, i.e. they subsist.

Given the proposition that the bulk of production and consumption in precolumbian Southeastern societies occurred at the household level and the premise that the study of past economies is crucial to understanding the history of cultural evolution, it is incumbent on archaeologists to determine, as best they can, the various cultural and environmental factors affecting production and consumption at the household level. This requires fundamental knowledge of the resource potential of a study area, a basic understanding of the social and political structure of each study group, a basic understanding of the variety of site types and of the settlement system as a whole, the ability to discern different types of "households" in the archaeological record, and a theoretical basis for modeling decision-making at the household level. The theoretical basis that has been adopted here conforms to the positions recently advocated by those seeking to integrate formalist and Marxist economic theory within a unified paradigm.

The Formalist Position

Within the last fifteen years there has been a rapid growth in the use of formal economic theory in the development of models pertaining to prehistoric economic behavior. These recent studies have primarily focused on elucidating subsistence patterns and on the application of "optimization" theory couched in such terms as "site catchment analysis," "optimal foraging," "risk minimizing," and "mini-max" theory (cf. Jochim 1976; Roper 1979; Earle and

Christenson 1980; Reidhead 1981; Styles 1981; Bettinger 1987; Keegan and Butler 1987; Winterhalder and Smith 1981). The application of these formalist models has great appeal to many archaeologists due to their emphasis on spatial patterning, subsistence, and quantifiable variables.

The basic assumptions in formalist economic theory are: (1) that human economic behavior is rational; (2) that humans strive to maximize return and minimize effort and risk in economic activities; and, (3) that there are a limited number of alternatives from which to choose (Herskovits 1952; Burling 1962; Barlett, ed. 1980; LeClair and Schneider 1968; Robbins 1932; Schneider 1974, 1975). Individuals are the basic units of investigation in formalist theory since it is at the individual level that decision-making occurs, and individuals are assumed to act primarily out of self-interest.

The propriety of using formalist models to explain economic behavior has been criticized on the basis that no known peoples totally maximize productive capabilities to full potential, and in many cases, other factors have been shown to influence decision-making behavior in ways counter to the maximization and self-interest principles (Barlett 1980; Dalton 1969; Godelier 1972; Polanyi 1957, 1968; Ross 1987; Sahlins 1972, 1976; Wilk 1989). The heralds of formalist economics, themselves, admit that they frequently fail to predict economic behavior using optimization (maximization) theory (cf. Gould 1986; Winterhalder 1987; Hawkes 1987). An excellent example of this failure to predict is found in Bennett's (1969) classic monograph on the "coping

strategies" of different ethnic groups in modern Canada. Here, Bennett found that some western ranchers and farmers "irrationally" continued to raise cattle instead of more profitable sheep because cattle raising conferred greater social prestige.

The inadequacy of true formalist models to account for this and other examples of "irrational" economic behavior has led to various attempts by some economic anthropologists and archaeologists to modify formalist principles to better accommodate the study of "irrational" economics. These modifications of formalist theory have normally taken the form of shifting the object of "maximization" away from profits toward other goals such as satisfaction (e.g., Herskovits 1952; Jochim 1976), energy capture (e.g., Winterhalder 1987), and fitness (Hawkes 1987), and the application of modern decision theory to emend "rationality" (e.g., Barlett, ed. 1980; Barlett 1989).

The applicability of formalist "rationality" as a universal human trait was attacked by substantivists (Polanyi 1944, 1968; Polanyi et al. 1957; Dalton 1969, 1975; Sahlins 1972) over two decades ago; it has also been rejected more recently by Marxists (e.g., Godelier 1972). Both groups view formal rationality (i.e., computation) as an culture bound concept which is inappropriate to non-western societies where informal reckoning, not formal calculations, are often the basis of evaluating the potential gains and losses of an enterprise. The self-interest motives assumed by formal theorists has also been criticized by those who point out that altruism and an orientation toward the family, clan,

or lineage and away from the individual exemplifies many societies (cf. Polanyi 1957, 1968; Sahlins 1972; Wilk 1989). Most economic anthropologists today, even those who have adopted most of the theoretical framework of formalist economics, have come to the conclusion that rationality, self-interest, and other aspects of decision-making behavior, are structured to various degrees by culturally defined goals and value systems (Bennett 1969; Bennett and Kanel 1983; Barlett, ed. 1980; Godelier 1972:99).

The Traditional Marxist Position

Marxist approaches to economic behavior have by and large ignored individual and household decision-making processes (cf. Long and Richardson 1978:203), and some, in fact, have castigated the idea all together.

> it is not possible to start from individuals and the general form of purposive behaviour in order to analyse the content of the rationality of economic systems and economic agents [Godelier 1972:26].

Traditionally, Marxists have approached economics and cultural change at the societal level. The particular theoretical perspectives adopted by those anthropologists who can be assembled under the label "Marxist" varies, but most seek explanations of social change in the contradictions between the social relations of production and the means or forces of production (cf. Cooper 1978; Friedman 1975; Kahn 1978; Long and Richardson 1978; Rey 1975; Sahlins 1976; Terray 1972; Wenke 1981; Prentice 1986b). And as Wenke (1981:94) points out, the greatest point of contention that has arisen among

Marxists has been with regard to the importance of the relations of production in determining the other aspects of society.

In Marx's original formulations, the "relations of production" referred to the ways in which humans organized the labor and the persons involved in productive tasks. The "forces of production" consisted of those tangible (i.e., physical) aspects involved in the material production and provisioning of society. These two heuristic concepts were viewed by Marx as the primary components of the "mode of production" or the economic "structure" of society. How these heuristic components were believed to be affected by one another are revealed in the following samples of Marx's writings.

> In the social production which men carry on they enter into definite relations that are indispensable and independent of their will; these relations of production correspond to a definite stage of development of their material powers of production. The sum total of these relations of production constitutes the economic structure of society--the real foundation, on which rise legal and political superstructures and to which correspond definite forms of social consciousness. The mode of production in material life determines the general character of the social, political, and spiritual processes of life. It is not the consciousness of men that determines their existence, but, on the contrary, their social existence determines their consciousness [Marx 1904:11-12; cited in Harris 1968:229].

> Apart from the degree of development, greater or less, in the form of social production, the productiveness of labour is fettered by physical conditions. These are all referable to the constitution of man himself (race, &c.), and to surrounding Nature. The external physical conditions fall into two great economic classes, (1) Natural wealth in means of subsistence, *i.e.*, a fruitful soil, waters teeming with fish, &c., and (2), natural wealth in the instruments of labour, such as waterfalls, navigable rivers, wood, metal, coal, &c. [Marx 1967:512].

It is clear in these examples and in other portions of his writings that Marx viewed the economic structure of a society as the primary determinant of the superstructure (the political and legal components of the society and their corresponding ideologies and belief systems). In turn, Marx believed that the mode of production (i.e., economic system) is determined by the interplay between the physical and historical circumstances involved in the process of material production (i.e, level of technology and the distribution and kinds of natural resources) and the social relations arising from the organization of production.

Simply put, Marx believed that the way a society is organized socially and politically is a direct result of the way the social organization of production and the material means of production interact to fulfill their role of providing the material needs of the society. Thus, the mode of production, the synthesis of relations of production and means of production, is viewed by most Marxist anthropologists as the primary object of economic study (Cooper 1978; Friedman 1975; Godelier 1972, 1973, 1975, 1980a, 1980b; Kahn 1978; Long and Richardson 1978; Marx 1967; Rey 1975; Terray 1972, 1975).

Some Marxists, however, are now arguing that the failure in traditional Marxist theory to consider the individual and individual households as the primary units of decision-making and economic behavior has been a major stumbling block within the paradigm. Part of this failure stems from Marx's conception of production as a purely social process. As O'Laughlin (1975:363)

points out, Marx never considered the individual as an independent unit of production. For Marx, all production was social, beyond individual control -- "independent of their will", as Marx (1904:11) put it. In essence, this was the same position that was adopted in regard to non-capitalist societies by the substantivists, that individual decision-making was institutionally "embedded" and primarily determined by society, not the individual (Polanyi et al. 1957). But, having already argued that any theory of cultural change must be grounded at the level of individual behavior and individual decision-making, it is necessary to somehow reconcile the apparent disparities between a Marxist perspective that typically portrays individuals as virtually incapable of independent behavior and the proposed epistemology of humans as individual decision-makers.

Reconciling Formalist and Marxist Economic Theory

In a recent article, Baber (1987) has argued that it is time to put away the old polemics of formalist economic theory versus Marxist economic anthropology. Much like Cancian (1966) dispelled the argument that substantive and formalist economics were necessarily exclusive and antithetical, Baber has argued that there is no necessary contradiction between formalist and Marxist approaches to the anthropological study of economic behavior. Baber also argues cogently that a fusion of formalist economic theory and Marxist theory offers the best avenue for developing a new

paradigm of socio-economic theory. This new paradigm would combine the formalist position that humans are rational decision-makers and maximizers with the Marxist (and substantivist) position that decision-making can be best understood when placed within the contexts of the social relations of production and the means of production. Such a paradigm, Baber argues, would overcome the inability of formal economic methods to explain, for example, the failure of individuals to maximize profit because of social values emphasizing maximization of prestige.

In a companion article to Baber's, Prattis (1987) has also argued for a fusion of formalist and Marxist economic theory. To avoid the epistemological inadequacies exhibited by classic formalist maximizing theory, however, Prattis advocates approaching decision-making and maximizing behavior in terms of "scheduling" (Flannery 1968) and "situational logic." This use of terms is meant to avoid the ethnocentrism associated with formalist decision-making theory, and to include the social "embeddedness" argued for in substantivist and Marxist theory. Prattis believes that modeling decision-making in terms of situational logic is preferable because it predicates that the decision-maker will arrive at the "best" decision based on socially determined values, past experience, and the particular situation involved. Prattis also agrees with Cook (1973) and Hart (1982), that the manner in which material goods are produced (i.e., the mode of production) should be a major focus of analysis.

More recently, various authors (e.g., Wilk 1989; Cheal 1989; Weismantel 1989) in the book entitled *The Household Economy* (Wilk, ed. 1989) have argued the utility of viewing decision-making behavior as occurring at different scales within nested levels of social context (e.g., individual, family, sodality, lineage, community). In many respects, this is complimentary to Prattis's arguments for approaching decision-making behavior in terms of situational logic since the decisions arrived at (self-interest, altruistic, autocratic, democratic, etc.) are directly affected by the social situation in which they occur (between spouses, among peers, unions, legislatures, etc.). This same approach has obvious utility in developing archaeological models of prehistoric behavior at different scales of analysis.

Because economic decision-making and by extension archaeological sites reflect human behavior and decision-making at various scales of society (individual, family, band, hunting party, etc.), situational logic is, theoretically, directly applicable to the study of past economies. Situational logic, as it is conceptualized by Prattis (1989), also correlates very well with the basic premise I offered at the beginning of this treatise, that ultimately it is at the individual level that decision-making occurs, that decision-making is variable and constantly being renegotiated by the individual, and that decision-making occurs within a social context and is therefore patterned by society.

But economic behavior is not purely cultural. Economic decision-making and behavior is also materially and corporeally based, and therefore linked to

environment (cf. Vayda 1969; Vayda, ed. 1969; Rappaport 1968). Although some Marxist anthropologists (e.g., Godelier 1980:270) and others (cf. Ellen 1982:21-51) would generally view these as simply "constraints" or "limiting factors," the numerous positions offered by Marxists and non-Marxists alike (e.g., Chang 1975; Flannery 1968; Moran 1979; Harris 1979; Ellen 1982; Butzer 1982; Bennett 1976; Bennett and Kanel 1983; Vayda and McCay 1975; Vayda and Rappaport 1968; Winterhalder 1977, 1980) have demonstrated the importance of including environment and ecological interactions as important factors in the economic decision-making process. It is, after all, from the environment that humans obtain their material provisions and it is upon the landscape that humans locate their homes and plan their activities. And as we noted earlier, even Marx, himself, recognized that the natural distribution of resources had a direct bearing on the mode of production.

Summary and Observations

As one may have gathered from the discussion presented above, I and many others and Marxists in particular believe that the study of the mode of production is fundamental to economic analysis which, in turn, is essential to the study of social process and cultural evolution. But, as one may have gathered in the previous discussion, economic analysis must focus not only on the mode of production, the process whereby people organize production within the social and natural environment in which they live, but also on how this is

integrated with other aspects of social behavior. And although economic studies may appropriately be pursued at the household, the lineage, the region, the society, or any other scale of analysis, it must ultimately be theoretically grounded at the level of the individual because it is at the individual level that behavior and decision-making actually occur.

Having already pointed out that archaeological methodology usually prevents approaching individual behavior directly, the present study attempts to model past individual economic behavior and site selection indirectly by focusing on the household as the basic unit of analysis. The method of analysis will consist of using the formalist theory of subsistence maximization and effort minimization as a heuristic model to see where it fails to explain expected production efforts. These models will be based on estimated production yields for various resources falling within a certain radius of each site (i.e., site catchment analysis), the current models categorizing the different means of production (e.g., hunting-gathering, gardening, swidden horticulture) for each major time period (Archaic, Woodland, Mississippian), and presumed relations of production and consumption at the household level during each of these periods. Where these models fail to predict expected subsistence behavior and site selection, other explanations (e.g., taste preferences, prestige maximization, religious practices) will be sought to explain these apparent contradictions to the model.

There is, of course, an orderly process by which I will present and discuss the various pieces of information and deliberation which have led to the final observations and conclusions presented here. As is true in any scientific endeavor, the first step toward any analysis is the definition and explication of those terms used in the process.

CONCEPTS AND TERMS

Economy and Production

Several definitions have been offered for the term economy (Burling 1962), each definition suiting a particular theoretical stance and purpose. The definition offered here has been articulated previously in one of my earlier articles. In that article I defined economy (and its adjectival form "economic") as the production, distribution, and consumption of material goods and the social contexts within which such activities occur" (Prentice 1987:193). This definition follows Cook's (1973) and Hart's (1982) arguments that economic theory must be grounded in the study of the social organization of the production of the material means of human existence, with production defined as the appropriation and transformation of natural resources to create a consumable product or commodity. Concordant with this stance is the position that economic decision-making occurs within a culturally structured context and is therefore patterned by society. This definition is not in conflict with the position that the means by which individuals make decisions regarding production (and thereby, distribution and consumption) are inevitably influenced by the availability of natural resources (cf. Ellen 1982).

I define production as the appropriation and transformation of natural resources to create a consumable product or commodity. I and many others (e.g., Godelier 1972; Cook 1973; Bloch 1975; Harris 1979; Hart 1982) believe that the study of the ways in which production is facilitated within a society is the fundamental key to economic analysis which, in turn, is essential to the study of social process and cultural change.

Economy is not the same as subsistence. Subsistence is defined as the appropriation and utilization of resources within an individual household in order to provide the food and shelter necessary to maintain a living. Subsistence, according to this definition, is a "pooling" process (Sahlins 1972) in which the material necessities of the household are satisfied. Household subsistence is, therefore, not simply a matter of making production decisions on an individual basis. Subsistence production is a social process with the individuals of a household cooperating (through volition and/or duress) in the production and consumption of subsistence items.

Within the last few years, archaeologists (Prentice 1981, 1983, 1985, 1987; Flannery and Winter 1976; Keegan and Butler 1987; Pauketat 1989) and anthropologists (Ellen 1982; Ross 1987; Tourtellot 1983; Clammer 1987; Long and Richardson 1978; Wilk, ed. 1989) alike have shown an increased emphasis on examining household economics and individual decision-making. A major emphasis of these and related studies (Arzigian 1987; Cohen 1987; Keegan and Butler 1987; Muller 1987; Winters 1974; Keene 1979; Reidhead 1981; Nassaney

1987; King 1987; Keegan 1987; Winterhalder 1987) has been the examination of the various factors affecting food production, i.e., subsistence production, and correlating these with various levels of political and social complexity (e.g., McBride and Dewar 1987; Cowan 1985; Keegan and Butler 1987; Muller 1987). Given the obviously significant economic role of households in the evolution of human societies, an important question then becomes, "How does one characterize different types of households for archaeological study?" and "How does one approach production and consumption at the household level?"

Characterizing Households

A household is a residential group that shares the daily burden of providing subsistence for everyone within the group. The most common residential groupings have been classified anthropologically (and archaeologically) into two basic types based on the number of marriage partners and the number of generations living within the household, these being referred to as "nuclear families" ("nuclear households") and "extended families" ("complex households") (Nimkoff and Middleton 1968; Keesing and Keesing 1971:199-202; Kottak 1982:122-123); but households are not limited to these two forms of family organization. A group of celibate religious specialists who pool their productive resources to provide the food and shelter necessary to maintain a daily existence constitute a household just as much as an unmarried, self-supporting, single mother and her children does.

Archaeologically, the identification of households in non-state societies has generally been based on the presence of sets of residential structures or occupational areas exhibiting evidence of the pursuit of most subsistence activities practiced by the majority of the individuals in the society (gardening, gathering, hunting, fishing, cooking, making clothing, making pottery, etc.) (Carr 1984; Flannery 1976; Muller 1984; Tourtellot 1983; Trigger 1968).

I have defined household as a residential group that shares the daily burden of providing food and shelter for everyone within the group, and indicated that the most common residential groupings identified in archaeological studies have been classified into two major types: nuclear households and complex (i.e., extended) households. These two major classificatory types are categories based on "composition," one of four variables by which households can be classified. The remaining three variables are "relations of production," "relations of consumption," and "economic independence."

Household Composition

Household composition refers to the age and sex structure of the household. Significant differences in age and sex structure occur between various households as a direct result of having greater or lesser numbers of residents within the household. Beyond these obvious differences, there are also changes in composition that occur in households as individuals age, leave natal households, join other households, procreate, and so forth. As residential

compositions change, economic activities change as well, reflecting the different social obligations and individual aspirations precipitated by seeking a sexual partner, child rearing, supporting an invalid, and so on (Chayanov 1966).

Due to its dynamic nature, individual household composition is very difficult to approach archaeologically. The estimated sizes and compositions (nuclear or extended) of various "households" identified from the archaeological record have been typically based on site, structure, and artifactual data (e.g., Brose 1970; Casselberry 1974; Hassan 1981; Kramer 1979; Naroll 1962) and the use of direct historical analogy (e.g., Deetz 1965; Longacre 1968; Willey 1977) and general comparative analogy -- the correlation of familial/social organization (band, tribe, etc.) with various forms of economic production (hunter-gatherer, swidden-agriculturalist, etc.) (e.g., Bettinger 1980, 1987; Braun and Plog 1982; cf. Gould and Watson 1982). But currently, without direct historical antecedents, it is often difficult to go beyond the simple characterizations of nuclear versus complex household. At present, generally it is necessary to assume "average" household compositions for each of these generalized household types. This is the case with the current study.

Relations of Production

Relations of production refers to the manner in which tasks are assigned and performed within the household. Sexual division of labor is one aspect of relations of production. By analogy and use of the direct historical approach, it is reasonable to assume that certain subsistence activities pursued by the

ancient inhabitants of a particular research area were often assigned and performed according to sex. For example, hunting animals, fishing, house building, and warfare are typically viewed as male activities in the Eastern Woodland area, while gathering plant foods, weaving, dressing hides, and making clay pots are typically seen as female activities (Swanton 1946:709-718; Herskovits 1952:140; Conkey and Spector 1984; Watson and Kennedy 1988), although, of course, none of these tasks were exclusively performed by males or females. Since economic activities are determined to some degree by social norms prescribing certain tasks for each of the sexes, the composition of the household will directly affect the range and proportions by which such activities are pursued at the household level and the artifact assemblage resulting from those activities. Assuming that sexual division of labor was characteristic of precolumbian Eastern Woodland residential groups in general, the identification of "male" and "female" activities in the archaeological record may be inferred at the household level by the occurrence of those artifact types used in the performance of tasks typically assigned according to gender. Again, this approach has been used in the present study.

With normal changes in household age structures there are also simultaneous changes in the relations of production within households. At certain stages in the life cycle, individuals are expected to perform different economic tasks, partly in conjunction with achieved status but also partly in conjunction with physical growth. The ethnographic literature is replete with

examples where the children and the elderly perform less demanding tasks than the average adult women and men (cf. Swanton 1946:715-718). Applying this general principle to the archaeological record, one could postulate, for example, that the collecting of shellfish found at Archaic shell mound sites was probably a task most often performed by young boys and girls in the accompaniment of adult women (cf. Meehan 1982) and at the attainment of adulthood, males probably participated in the collecting of mussels to a much lesser degree than women normally did. Such adjustments in the performance of other household tasks as a result of changing age structures no doubt occurred prehistorically in the Eastern Woodlands, judging from the early ethnohistoric accounts.

Changes in household composition also result in changes in household production activities due to changes in attitudes regarding individual aspirations and perceived needs. This aspect of household production was central to Chayanov's (1966) classic analysis of peasant economics in early 20th century Russia. Popularized as "Chayanov's rule" (Sahlins 1972:87), the basic premise -- minimization of effort occurs once basic household needs are satisfied -- was adopted as a primary principle of Sahlins' (1972) domestic mode of production. An important aspect of this principle is the fact that household needs (i.e., individual needs) and relations of consumption change as the family structure changes through time. For example, a young girl requires less food than an adult woman, so less work is required to provide the

girl with adequate nutrition. Likewise, a young man attempting to accumulate bride wealth may work longer hours and require different material resources than a married man. In a similar vein, the tasks performed in a household consisting of a middle aged married couple with two girls of ages 7 and 10 and two boys of ages 13 and 16 will vary considerably from a household consisting of a newly married couple who have moved into the home of the bride's parents where there are no other children.

Relations of Consumption

Relations of consumption refers to the allocation of available resources within the household. In a way, it is the necessary antithesis to the "pooling" of resources that characterizes all households (Sahlins 1972:94). All of the members in a household consume resources differentially in response to variable nutritional, corporeal, social, and spiritual needs. Archaeologically, it is possible to identify differential consumption of some food sources through various analyses of skeletal populations (Ambrose 1987; Bender et al. 1981; Buikstra 1977; Buikstra et al. 1987; Gilbert 1977; Schoeninger and Peebles 1981), but the detection of differential consumption of other non-edible resources within the household are also significantly relevant to the study of household economics. It was, after all, the apparent differential consumption of exotic resources (marine shell and finely made ceramics) at the American Bottom Mississippian Lab Woofie farmstead (Prentice and Mehrer 1981; Prentice 1981) that first drew me to the investigation of household economics,

and there are many examples where the study of the household consumption of such materials offers the potential to contribute greatly to our knowledge of social obligations, exchange, and household economic independence.

Economic Independence

One of the more significant economic developments that has accompanied the rise of complex societies has been an increase in extra-household economic integration, and the concomitant forfeiture of household economic independence. In other words, the decisions that household members have been able to make concerning production and consumption choices has been superseded more and more by social and political factors outside the control of the individual household members. For a few individuals this has meant significant control over the production and labor of others, a development which is sometime referred to as "exploitation" (e.g., Miller and Tilley 1984; Terray 1975:88; Harris 1979:237). The increased economic integration of households has also been accompanied by increased specialization in services and the production of commodities, more complex exchange systems, and increased levels of production.

The trend towards greater integration of household economies and the concomitant loss of freedom in choosing economic alternatives has been a nearly worldwide development. From an analytical standpoint, this trend can be approached from at least two different perspectives: specialization and obligation.

Specialization

Specialization is a topic which has received much attention in the archaeological literature (Peebles and Kus 1977; Peacock 1981, 1982; Prentice 1983, 1985, 1987; Muller 1984, 1986; Yerkes 1983, 1986; Rice 1981; Brumfiel and Earle, ed. 1987; Leader 1988) because it has been shown to be an integral aspect in the rise of social complexity (Polanyi et al. 1957; Service 1962; Sahlins 1963; Steward 1972; Friedman 1975). A complete discussion of this topic is well beyond the purposes of this inquiry, but it is important to raise certain points since certain aspects of "producer specialization" and "site specialization" (limited activity sites) are addressed later on in the dissertation.

Specialization, as I define it, refers to the routine performance of a service for non-household members for which one is materially compensated or the production of a commodity for consumption by others outside one's own household. The explicit assertion that specialization is an economic activity specifically oriented toward extra-household consumption has been a significant omission in previous studies dealing with economic specialization (e.g., Muller 1984, 1986; Brumfiel and Earle 1987). It is this extra-household distinction, with the qualifier "routine" which truly distinguishes specialist production and specialist services from basic household subsistence production and social interaction. Attempts to identify specialization and household economics in general should thus be directed toward detecting and measuring those ways in which extra-household oriented production (i.e., commodity

production) and economic specialization can vary: intensity, product diversity, regularity, and scale.

Intensity of specialization, as it is used here, refers to the amount of time spent daily in the performance of an economic service or the production of a commodity. It is in respect to intensity of specialization that the terms "part-time" and "full-time" have true applicability (cf. Muller 1984). The amount of time spent in a particular task multiplied by "labor effort" (leisurely work verses hard work) gives us the "labor magnitude" or the total amount of labor (energy) expended. All else being equal, it is generally assumed that increases in labor magnitude (resulting from increased labor effort or working longer hours or both) directly results in the production of larger quantities of commodities or more services. The "volume of product per individual specialist" noted by Brumfiel and Earle (1987:5) is thus the result of the combination of several factors which includes: level of technology (tools used, materials used, energy sources, etc.), the intensity of specialization, labor effort, and individual skill. Unless there is evidence that changes have occurred in the level of technology or the organization of labor, increases in production (or services) are thus assumed to be indirect measures of increased labor magnitude which in turn is the product of increased labor effort and/or labor time, i.e., intensification of specialization.

Labor intensification is a pattern that has long been associated with the rise of social complexity (Boserup 1965; Carneiro 1967, 1970; Cohen 1977;

Harris 1971; Sahlins 1972; White 1959). The reason for this rise in intensification is normally attributed to the need to provide for greater numbers of non-self-supporting specialists within the society and to support larger population numbers using essentially the same resource base. Detection of labor intensification in the archaeological literature has generally been concerned with production sites, particularly "workshops," where specialized tools and abnormally high amounts of waste materials resulting from the production of material goods are seen as direct evidence of labor intensification and thereby specialization (Mason and Perino 1961; Peebles and Kus 1977; Porter 1973; Prentice 1983, 1985; Yerkes 1983; Muller 1984). Less direct and more often subsumed within the study of status differentiation, but indicative of intensification of specialization nonetheless, are those examples where analyses of past mortuary practices permit the recognition of individual specialists. Individuals buried with specialized tool kits (e.g., Bushnell 1914:649-651) and other items denotative of "status" (cf. Brown 1971) are often indicative of the formal recognition of specialists in past societies, including both service specialists (e.g., shamans and priests) and production specialists (e.g., lithic specialists). One can infer from those instances where the identity of the interred individual is expressed by the trappings of office or the tools of a craft, that the individual devoted enough of their labor to the performance of a limited range of tasks or services to be recognized as a specialist by his or her own community members.

Product diversity refers to the degree to which a wide or narrow range of services are offered or commodities are produced. This aspect of choosing economic alternatives is related to what Cleland (1976) was referring in his "focal"-"diffuse" dichotomy and, likewise, what Winters (1974) was referring to in his discussion of broad-spectrum versus narrow-spectrum economies. The advantages one gains by focusing on the production of a limited number of resources or providing a single service in terms of increased skill and efficiency, increased productivity, etc., has been thoroughly discussed in a plethora of books and articles (e.g., Herskovits 1952; White 1959; Harris 1971; Winters 1974; Renfrew 1975:10; Leader 1988) and needs little further amplification here. Performing a limited range of production tasks or services allows the development of skills and abilities which the occasional producer cannot. When producers specialize in the production of a few commodities or services, specialized tools may also be developed which further increase efficiency and productivity.

Regularity of specialization refers to the frequency with which specialization is practiced among the various households comprising the society. There is a direct correlation between regularity of specialization and social complexity. Specialists, even part-time ones, are more frequent in tribal level societies than they are in band level societies, and appear in increasing frequencies in chiefdom and state level societies (Harris 1971; Herskovits 1952; Kottak 1982; Prentice 1983).

Production scale refers to the degree to which individuals from different households work together in the performance of specific economic tasks. The lowest possible production scale is the single individual producing one commodity, a situation that is common in simple handicraft production. In modern capitalist economies the level of production scale which can occur may be extreme; in some cases individuals from thousands of households work together in a single factory to produce a single part of a commodity assembled at another factory. Less extreme examples of scale involving individuals from multiple households can likewise be found in ethnohistoric sources describing the economic customs of the aboriginal populations of the eastern United States. These include the preparation and planting of agricultural fields and the communal hunting of deer (Swanton 1946:317-321). Bartram's (1980:400-401) discussion of the organization of planting and harvesting among the Southeastern Indians is illustrative of the first form of economic integration:

> This is their common plantation, and the whole town plant in one vast field together; but yet the part or share of every individual family or habitation, is separated from the next adjoining, by a narrow strip, or verge of grass, or any other natural or artificial boundary.
>
> In the spring, the ground being already prepared on one and the same day, early in the morning, the whole town is summoned, by the sound of a conch shell, from the mouth of the overseer, to meet at the public square, whither the people repair with their hoes and axes; and from thence proceed to their plantation, where they begin to plant, not every one in his own little district, assigned and laid out, but the whole community united begins on one certain part of the field, where they plant on until finished; and when their rising crops are ready for dressing and cleansing they proceed after the same order, and so on day after day, until the crop is laid by for ripening. After the feast of

> the busk is over, and all the grain is ripe, the whole town again assemble, and every man carries off the fruits of his labour, from the part first allotted to him, which he deposits in his own granary; which is individually his own [Bartram 1980:400-401].

In the case of the agricultural example presented above, the times of planting and harvesting were not the prerogatives of individual families, but were at the discretion of a village leader (Bartram's "overseer"), presumably in consultation with other village leaders. Apparently, communal deer hunting expeditions in the Southeast were often similarly organized, with the decision of where and when to hunt usually left to an elder or leader (Swanton 1946:311, 319). Obviously, these scales of production are less intensive, less frequent, and not as tightly organized in comparison to the modern factory example, but they demonstrate the fact that scales of production larger than the individual household were present in these non-state societies and presumably were economic patterns that were present prehistorically in the eastern U.S. They also illustrate how the general rise in social complexity has been accompanied by an increase in production scale, in some cases virtually eliminating the ability of the average worker in complex, state-level societies, to obtain a living without working with non-household members and without expending substantial amounts of time in production efforts organized and controlled by individuals outside the household unit.

The factors affecting the economic decisions of individuals may be the result of a number of conditions including availability of raw materials, social circumscription, education and training, technology, lineage, religious beliefs,

ambition, etc., but in nearly all cases these conditions are socially expressed and regulated in terms of the economic rights which the individual enjoys and the obligations one must meet if he or she is to function as an accepted member of the society. Production of goods for extra-household consumption may therefore be the result of incentives other than simple economic gain. They may be the result of the need to meet social and economic obligations.

Obligation and Household Production

As an accepted member of any society, an individual is guaranteed certain rights of access to those lands and/or subsistence items necessary to sustain a living. In return, the individual is encumbered with certain obligations which he or she must fulfill if they are to continue to enjoy these rights. Economic obligation refers to those social circumstances in which certain material payments are required to meet the socially prescribed obligations of bride wealth, legal fines, tribute, taxes, etc.

With increases in social complexity there has been a general increase in obligations that can only be satisfied through economic activity. We, as members of capitalist societies, are well aware of the economic consequences of having to pay the taxes necessary to support the political and military systems of modern states. Prior to the worldwide adoption of general purpose currency as an acceptable medium of exchange and payment of social debt, the materials used in meeting obligations were more often the direct result of individual productive efforts (Dalton 1967; Polanyi 1968; Prentice 1987; Smith

1983; Speck 1919). As students of anthropology, we are familiar with the numerous examples of dowry and bride wealth where prospective brides and grooms must produce the goods that will be used to satisfy the social obligations involved in obtaining a mate, and we are all certainly well aware of the obligation of paying tribute to leaders of chiefdoms and states with the fruit of one's own fields. Perhaps less direct, but nonetheless, similar in result is the payment of obligations purely through the contribution of labor such as the communal planting and harvesting of the chief's fields among the Trobriand Islanders (Malinowski 1984) or the construction of public buildings as part of the corporate labor *mita* system found among the Indians of Peru (Moseley 1975).

Although fulfillment of social obligations may involve either the relinquishing of material goods or of services to members of the society outside the household, the basic principles governing social obligations are ideally the same: peers are expected to reciprocate equally among themselves; subordinates are expected to support and obey their superiors; superiors are to protect and guide their subjects. The separation between the ideal and the real are, of course, another matter (and a topic best covered elsewhere), but the point to be made here is that social obligations often require economic activity oriented toward producing goods and/or providing labor for individuals outside one's own household, most often for a community leader and his or her retinue.

Thus, it is the factor of obligation which really distinguishes Brumfiel and Earle's (1987) category of "attached specialist" from "independent specialist" because the attached specialist is socially obligated to produce for a particular person while the independent specialist is not so directly obligated. The activities and the material consequences of meeting social obligations can be virtually the same as those precipitated by independent production of commodities for trade, and the parameters for evaluating both forms of extra-household oriented economic activity (intensity, product diversity, regularity, and scale) equally apply.

Summary and Observations

The brief discussions and examples presented in this chapter have illustrated some of the complexities and difficulties involved in the archaeological study of household economics. Nonetheless, the detailed analyses of household economics is essential if more refined models of social change are to be formulated in the future. It is essential because both production and consumption at the household level forms the keystone of economic activity in all non-state societies.

Basic to the analysis of household economics in non-state societies is the study of patterns of subsistence production. Although the study of subsistence production alone does not provide a complete picture of past economic behavior, it does provide the basis for evaluating relationships between this important

aspect of production within the society with other patterns of production, transference, consumption, residence, etc. In the present study, the relationship between settlement patterns and subsistence production will be the focus of attention. In order to evaluate this relationship, it is first necessary to describe the physical setting of the study area, the history of archaeological investigations that have led up to the current study, and the archaeological record as we now know it.

THE PROJECT STUDY AREA

Introduction

Mammoth Cave National Park was formally established in July, 1941, encompassing an area of roughly 19,750 ha (48,800 acres) including portions of Edmonson, Hart, and Barren counties in south-central Kentucky. Due to the intervention of World War II, the Park was not formally dedicated until September, 1946. The total acreage of the Park is presently 20,567.25 ha (50,821.66 acres). Principally established as a natural recreation area, the Park contains within its boundaries hundreds of prehistoric and historic sites, many of which have regional if not national significance.

The following section presents a summary of the environmental setting of the Park, including topography, major vegetation zones, wildlife, and generalized description of the resource potential of the natural biotic communities that existed in the Park prehistorically. This synopsis is based on data gathered during the Mammoth Cave National Park Archeological Inventory Project (Prentice 1988, 1989b, 1990a) and on detailed studies provided by Carstens (1980), Ellsworth (1934), Faller (1975) Latham (1969), Palmer (1981), Reidhead (1981), Wagner (1978), and Watson and Carstens (1982).

Topographic and Geologic Setting

Mammoth Cave National Park (MCNP) is located in south-central Kentucky. The southern portion of the Park (south of the Green River) lies within the Central Kentucky Karst portion of the Pennyroyal Plateau (also known as the Mississippi Plateau), while the northern portion lies within the Chester Upland of the Western Coal Field (Palmer 1981; Figure 1). The Chester Upland is formed principally of Mississippian and Pennsylvanian age sandstones and limestones while the Plateau is composed mainly of Mississippian age limestones.

The limestone beds that outcrop in the Park are Mississippian in age and consist of three major formations in the following ascending order: St. Louis, Ste. Genevieve, and Girkin. On the upland ridges north and south of the Green River, these limestone beds are capped by the Big Clifty Formation, a sandstone layer roughly 15 m (50 ft) thick (Palmer 1981:48). It is the Big Clifty sandstone layer that produces the majority of rockshelters that occur in the Park.

In the Chester Upland area north of the Green River, the Big Clifty Formation is overlain by the Haney Formation (limestone), the Hardinsburg Formation (sandstone), the Glen Dean Formation (limestone), the Leitchfield Formation (shale), and the Caseyville Formation (conglomerate sandstone).

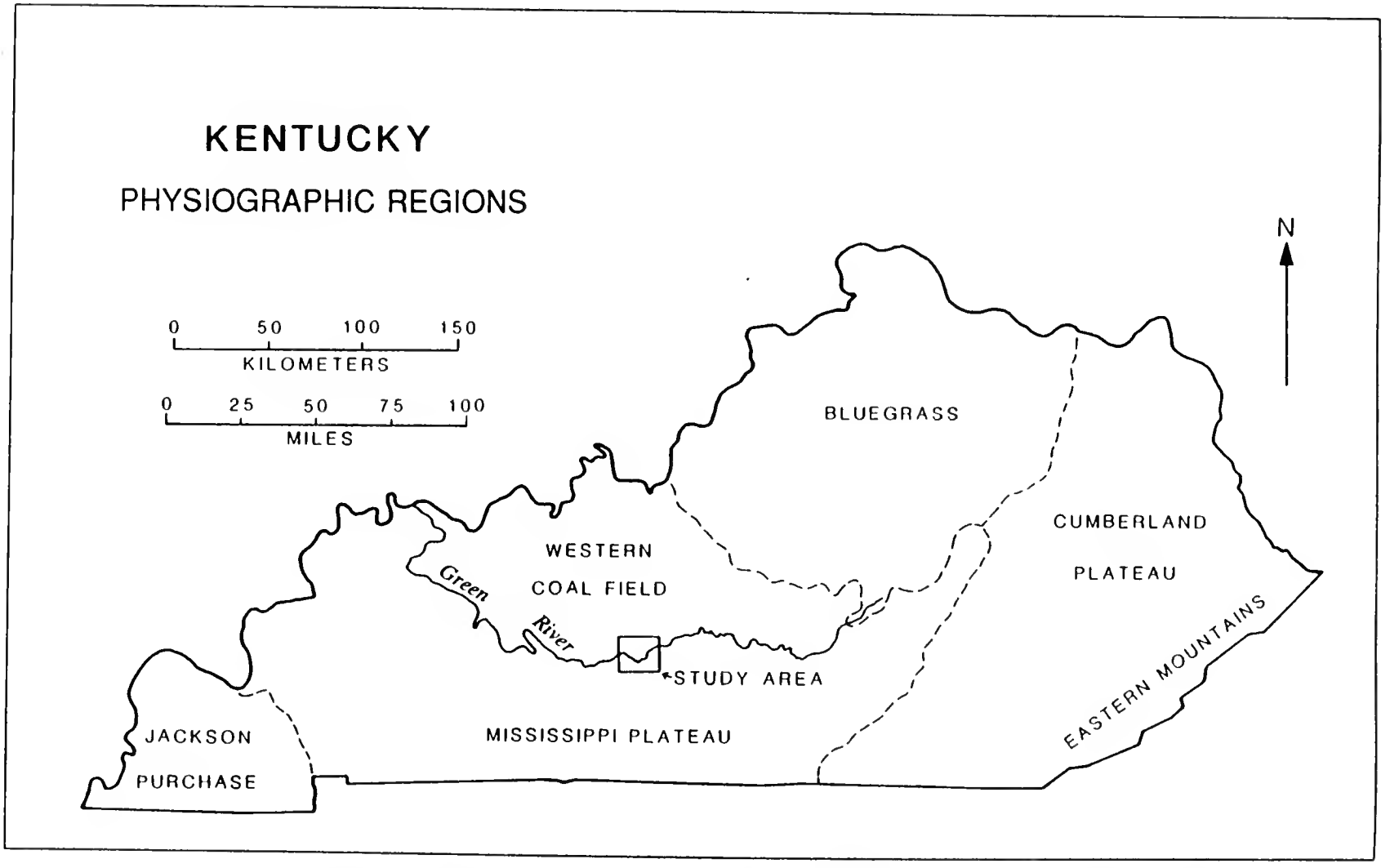

Figure 1. Physiographic Regions of Kentucky and the Location of the Study Area within the Western Coal Field and Pennyroyal (Mississippi) Plateau.

The Caseyville Formation is another sandstone layer within the Park in which rockshelters may occur.

Watson and Carstens (1982) have identified three different types of terrain within the Park: (1) the Hilly Country north of the Green River; (2) the Mammoth Cave Plateau south of the Green River, which includes the majority of karstic features in the Park; and, (3) the Green River valley (and its tributaries) that divides the Park into its northern and southern portions. These terrain types reflect the underlying geological structures described above.

In this study the topography of the Park has been divided into four different categories: (1) the upland ridges; (2) the upland valleys; (3) the floodplains; and, (4) the bluffline areas (Figure 2). This division is based on differences in elevation, ground slope, soil types, and vegetative cover. The upland ridges cover 9182.92 ha, making this zone the largest topographic section (44.65%) of the Park's total area. In contrast, the upland valleys are relatively small comprising only 6.56% (1348.84 ha) of the Park. The floodplains and the bluffs make up 6.66% (1370.71 ha) and 42.13% (8664.78 ha) of the Park area, respectively. Within the floodplain zone lie the Green and Nolin rivers which presently occupy 260.28 ha.

North of the Green River, the uplands can be characterized as wide ridges into which the tributaries of the Green River have made deep incisions

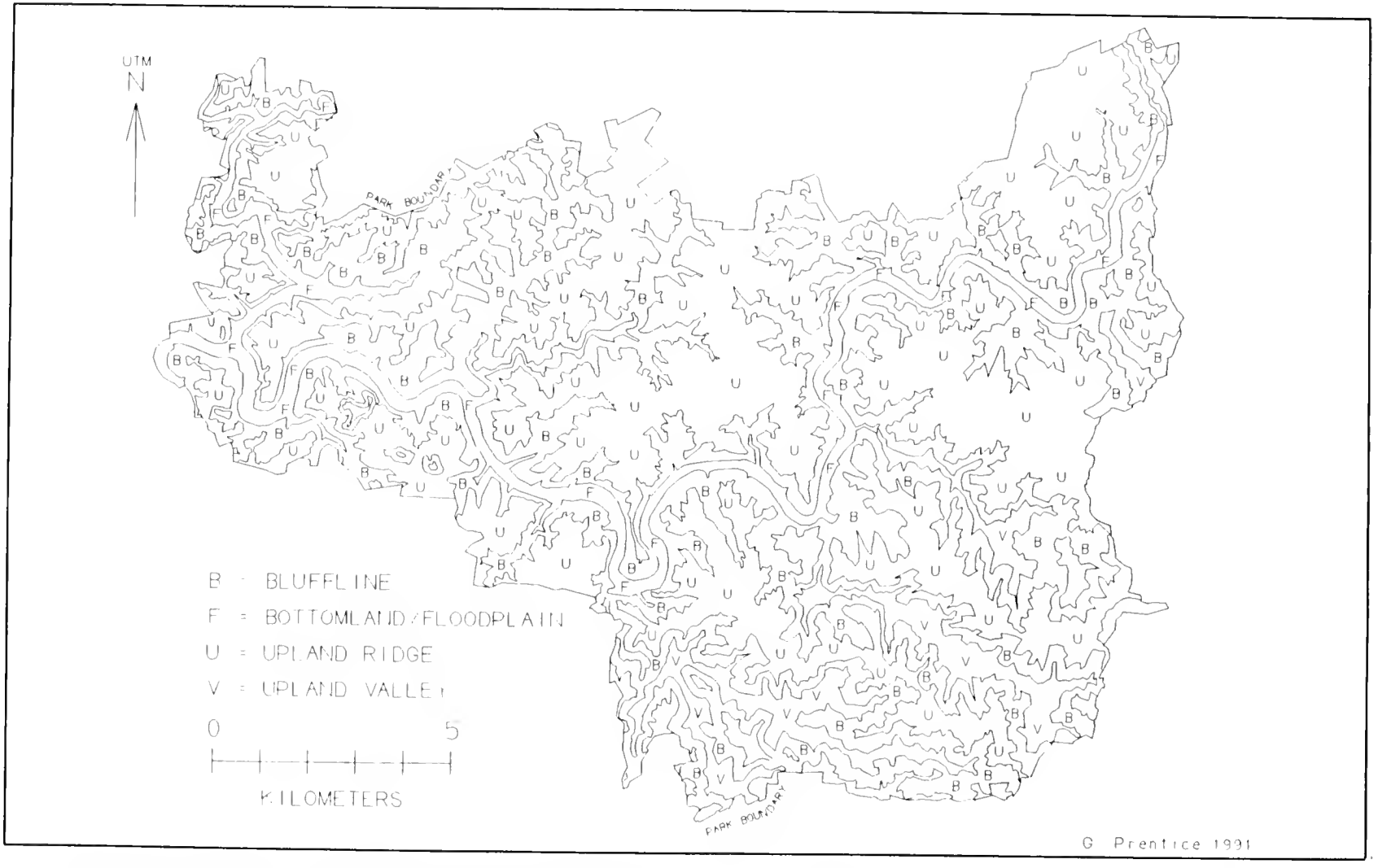

Figure 2. Major Topographic Zones within Mammoth Cave National Park.

to form the bluffline areas. South of the Green River, the uplands can be characterized as wide ridges separated by deep valleys resulting from the dissolution and breakdown of the underlying limestone formations. Surface water in this portion of the Park is typically lacking as rainwater runoff is quickly channeled into the limestone caves beneath the surface. The difference in surface water availability between the Mississippi Plateau and Western Coal Field is very pronounced with a near absence of streams south of the Green River and a dendritic river system north of the Green River (Figure 3).

The bluffline areas of the Park, with their steep slopes and overhanging cliffs, contain a variety of rockshelters and caves for which the Park is well known, particularly Mammoth Cave. The ruggedness of the blufflines present difficulties for those who would traverse the area on foot. In compensation for this, however, the large expanses of exposed sandstone and limestone formations provide a variety of useful and easily accessible mineral resources.

From the base of the blufflines to the banks of the Green River and its tributaries lies the floodplain area. The Green River is deeply entrenched in the floodplain with steep river banks exceeding 3 m in height in many areas. In comparison with other midwestern and southeastern riverine floodplains, the Green River floodplain, in this portion of the state, is quite narrow with a maximum width of only 400 m within the Park.

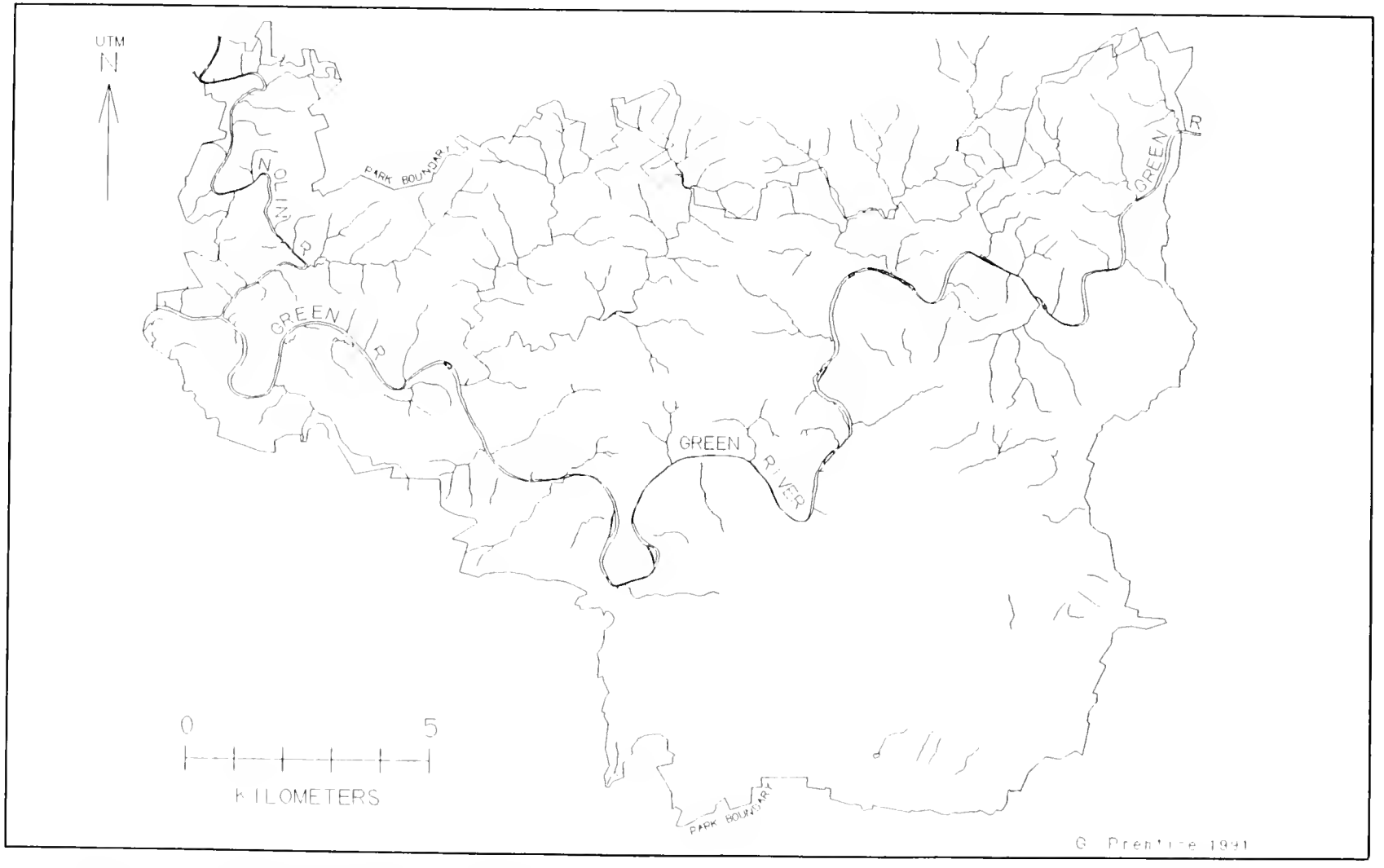

Figure 3. Surficial Hydrology in Mammoth Cave National Park.

Major Vegetation Zones

The present major vegetative communities within the Park correspond closely with the four major topographic zones discussed previously; Oak-Hickory forests characterize the upland ridges; Cedar-Pine mixed with grasslands characterize the upland valleys; Maple-Beech forests occur in the bluff areas; and Sycamore-Box Elder communities typify the floodplains. Within the four major vegetative zones smaller microbiomes may occur where the vegetative resources vary according to local soil types, water drainage, and temperature differences due to solar exposure (Ellsworth 1934; Faller 1975; Wagner 1978). The most noticeable of these microbiomes are the remnant eastern hemlock (*Tsuga canadensis* (L.) Carr) groves that occur in the bluffline areas of the Chester Upland, primarily on north facing slopes.

Soils in the upland ridge areas are typically deep, sandy, acidic, easily eroded, and generally limited in agricultural potential (Latham 1969; Carstens 1980:51-52). The Oak-Hickory forests associated with this topographic zone are dominated by black oak (*Quercus velutina* Lam.), white oak (*Quercus alba* L.), chinquapin oak (*Quercus muehlenbergii* Engelm.), pignut hickory (*Carya glabra* (Mill.) Sweet), shagbark hickory (*Carya ovata* (Mill.) K. Koch), northern red oak (*Quercus rubra* L.), and yellow poplar (*Liriodendron tulipifera* L.) (Ellsworth 1934; Faller 1975). Other plant species associated with this zone include scarlet oak (*Quercus coccinea* Muenchc.), post oak (*Quercus stellata* Wangenh.), southern red oak (*Quercus falcata* Michx.), black tupelo (*Nyssa*

sylvatica Marsh.), black walnut (*Juglans nigra* L.), dogwood (*Cornus florida* L.), sassafras (*Sassafras albidum* (Nutt.) Nees), sourwood (*Oxydendrum arboreum*), Carolina buckthorn (*Rhamnus caroliniana* Walt.), mountain laurel (*Kalmia latifolia* L.), hazelnut (*Corylus americana* Walt.), farkelberry (*Vaccinium arboreum*), serviceberry (*Amelanchier arborea* (Michx. f.) Fern), black haw (*Viburnum prunifolium*), and blueberry (*Vaccinium* sp.). Several species of edible mushrooms including morels (*Morchella esculenta*) and puffballs (Lycoperdaceae) are also abundant within this zone. Prehistorically, American chestnut (*Castanea dentata* (Marsh.) Borkh.) would have been present in significant numbers.

Soils in the bluffline areas are more variable, primarily as a result of localized surficial geology and ground slope, but can be generally characterized as shallow, rocky, and unsuitable for agriculture. The Maple-Beech forests associated with the bluffline areas are predominated by American beech (*Fagus grandifolia* Ehrhart.) and sugar maple (*Acer saccharum* Michx.) (Ellsworth 1934; Faller 1975). Secondary tree species include white oak, yellow poplar, northern red oak, chestnut oak (*Quercus prinus* L.), slippery elm (*Ulmus rubra*), shagbark hickory, bitternut hickory (*Carya cordiformis* (Wangenh) K. Koch), pignut hickory, mockernut hickory (*Carya tomentosa* (Poir.) Nutt.), white ash (*Fraxinus americana* L.), mountain laurel, witch-hazel (*Hamamelis virginiana* L.), bigleaf magnolia (*Magnolia macrophylla* Michx.), umbrella magnolia (*Magnolia tripetala* L.), pawpaw (*Asimina triloba* L. Dunal.) and

persimmon (*Diospyros virginiana* L). Other plant species associated with this zone are spice bush (*Kalmia latifolia*), viburnums (*Vibernum* sp.), and wild hydrangea (*Hydrangea arborescens*). Morels and puffballs are also present within this zone.

Soils in the floodplain areas are Quaternary in age and can be characterized as well drained to somewhat poorly drained alluvium, slightly acid to neutral, and suitable for agriculture (Latham 1969; Carstens 1980:51). The Sycamore-Box Elder forests associated with the floodplain areas are predominated by sycamore (*Platanus occidentalis* L.), box elder (*Acer negundo L.*), river birch (*Betula nigra* L.), and black willow (*Salix nigra* Marsh.) (Ellsworth 1934; Faller 1975). Secondary tree species include slippery elm, winged elm (*Ulmus alata* Michx.), american hornbeam (*Carpinus caroliniana* Walt.), yellow poplar, hackberry (*Celtis occidentalis* L.), red maple (*Acer rubrum* L.), black cherry (*Prunus serotina* Ehrh.), wild plum (*Prunus americana* Marsh.), honey locust (*Gleditsia aquatica* Marsh.), red mulberry (*Morus rubra* L.), white ash, and witch-hazel. Understory plants include spice bush, grapes (*Vitis* sp.), blackberrys (*Rubus* sp.), and cane (*Arundinaria* sp.).

It should be noted that the vegetative communities currently existing in the Park have been altered from the "natural" state that existed prior to the arrival of Euro-Americans in the late 1700s (Prentice 1993). Introduced European diseases such as Chestnut Blight and Dutch Elm Disease, forest fires, selective lumbering, and land clearing practices for agriculture and

grazing have modified the makeup of the various vegetative communities. The best example of this is in the upland valleys where nineteenth and early twentieth century land clearing and farming practices have produced a successional forest of cedars, pines, and grasslands. Some evidence suggests that the pre-Euro-American vegetative communities in these upland valleys consisted of a forest dominated by oaks and would have been similar in composition to Faller's (1975) "Mixed Woods" category, which includes white oak, southern red oak (*Quercus falcata* Michx.), northern red oak, black oak, chinquapin oak, and mockernut hickory (Wagner 1978; Carstens 1980:60).

The prehistoric distribution of the vegetative communities in the area has not been studied in detail, but generalizations can be made based on the existing archeobotanical and limited pollen data. Present ideas hold that the correlation of vegetative communities with the major topographic zones outlined above has been a relatively stable one since the Hypsithermal, roughly 5000 to 6000 years ago (Carstens 1980:59-60; Delcourt and Delcourt 1981; Prentice 1993; Wagner 1978; Watson and Carstens 1982:24). Prior to this time the vegetative regimes were considerably different, reflecting the major global warming and cooling trends that followed the last ice age.

The general sequence for environmental change in the Kentucky region shortly before and during the times of known human occupation can be summarized as follows. The peak of the Late Wisconsin Continental Glaciation is dated 16000 B.C. (Delcourt and Delcourt 1981). Located some distance from

the Laurentide Ice Sheet, Kentucky was dominated by Jack Pine forest with spruce and fir as subordinate species.

By around 12000 B.C., a warming trend began that caused the retreat of continental ice and the migration of major forest zones toward the north. Spruce-Jack Pine forest came to dominate the Kentucky landscape. With continued climatic amelioration, the migration of forest zones toward the north continued, so that by roughly 8000 B.C., Kentucky became dominated by Mixed Hardwood forests with relic "islands" of spruce and fir occurring at higher elevations.

From roughly 7000 to 3000 B.C. there was a warming and drying trend that is now referred to as the Hypsithermal Interval. This climatic shift was due to an increase in the westerly prevailing winds and resulted in another shift in the Midwest's biotic regimes. In Kentucky, the Mixed Hardwood forests changed to Oak-Hickory dominated forests in the western portion of the state with Mixed Hardwoods continuing to predominate in the eastern. Remnants of hemlock, spruce, and fir continued to persist where conditions would permit, primarily north facing bluffline areas.

Following the warm and dry conditions of the Hypsithermal, there has been a cooling trend with generally increasing precipitation that has persisted until the present time. Since this time, the predominant forest zones of Kentucky have apparently changed very little (Delcourt and Delcourt 1981).

Archaeological studies have reasonably demonstrated that the currently existing major forest zones in the Park were established by sometime around 4000 B.C. (Wagner 1978; Carstens 1980; Prentice 1993), but there is some evidence that localized changes in vegetation zones occurred (Schoenwetter 1974; Wagner 1978:28; Carstens 1980:60-61; Yarnell 1974b), possibly as a result of human alteration of habitat (e.g., forest clearing) or climatic perturbations (e.g., periods of drought). These variations do not appear to have affected to any significant degree the correspondence between major vegetation zones and the major topographic zones in the Park.

Primary Floral Resources

Knowing that the major plant communities were established by roughly 4000 B.C. and that the general distributions of plant resources within each of the major topographic zones have also remained stable, it is possible to begin modeling resource potential and how human patterns of plant exploitation affected prehistoric settlement patterns. It is first necessary, however, to identify those individual plant species that could have been utilized, where and when they were available for exploitation, and how efficiently they could be harvested and stored for use. To assist in the presentation of this plant resource data, Table 1 has been compiled for the reader.

The information contained in Table 1 has been derived primarily from Reidhead's (1981) extensive study of plant resources for southeastern Indiana.

The data format is different from Reidhead's, however, in that the estimated potential harvest is given in terms of kilograms-per-hectare and not in terms of total site catchment area. The derived figures in Table 1 will then be used on a site by site basis to estimate catchment harvest rates for different site catchments in the Park.

Other than data format, the only other difference between the original figures presented by Reidhead and those presented in Table 1 involve the categories of mushrooms and sunflowers. Reidhead did not evaluate the potential to which mushrooms and sunflowers could have contributed to the diets of prehistoric native Americans, but the abundance of mushrooms in the Mammoth Cave area and the occurrence of sunflower seeds in the archaeological record necessitate the inclusion of these species in a subsistence optimization model.

The author collected morel mushrooms several times while pursuing archaeological research in the Park. Appearing on the upland ridges and the upper slopes of the bluffline areas in mid-spring, morels can be gathered in large numbers. At the right time of year, a person can easily collect a five-pound paper bag full of morels in about one hour. Requiring no other processing, they can be eaten raw or cooked. Humans are not the only animals that consume morels, however. Squirrels eat them (personal observation), and other omnivores no doubt consume them as well. Based on the gathering experiences of the author at Mammoth Cave and an estimated loss of 50% of

Table 1. Availability of Selected Wild Plant Resources in the Mammoth Cave Area.

Plant Species	Topographic Zones	Seasonal Availability	Estimated Harvest* (edible kg per ha)	Procurement Cost (workhours/100 kg edible) Fresh	Stored
Chenopod Greens	Floodplain	Spring	0.5456	44.0	-
Poke Greens	Bluffline	Spring	0.1790	44.0	-
Other Greens	Floodplain	Spring	0.7160	100.0	-
Mushrooms	Upland	Spring	0.5000	110.0	-
Tubers	Floodplain	Spring	7.5350	60.0	85.0
Amaranth Greens	Floodplain	Summer	2.6207	44.0	-
Chenopod Greens	Floodplain	Summer	0.5456	44.0	-
Other Greens	Floodplain	Summer	0.3580	100.0	-
Berries (Rubus)	Floodplain	Summer	0.0500	65.0	81.0
Black Cherries	Floodplain	Summer	50.0000	60.0	74.0
Blueberries	Bluffline	Summer	0.0000	65.0	81.0
Grapes	Floodplain	Summer	0.6423	28.0	46.0
Maize (Green)	Floodplain	Summer	1570.9200	71.1	-
Squash	Floodplain	Summer	3141.8400	13.3	-
Tubers	Floodplain	Summer	1.4492	60.0	85.0

Table 1. Continued.

Plant Species	Topographic Zones	Seasonal Availability	Estimated Harvest* (edible kg per ha)	Procurement Cost (workhours/100 kg edible) Fresh	Stored
Acorns - Bitter	Upland	Fall	15.4700	160.0	170.0
Acorns - Sweet	Upland	Fall	164.1250	500.0	510.0
Black Walnuts	Floodplain	Fall	95.2000	887.0	897.0
Chenopod Seeds	Floodplain	Fall	400.1400	153.0	163.0
Hawthorns	Floodplain	Fall	0.0500	65.0	81.0
Hazelnuts	Floodplain	Fall	0.1683	1277.0	1287.0
Hickory Nuts	Upland	Fall	13.1970	4000.0	4010.0
Maize	Floodplain	Fall	1570.9200	71.1	83.7
Pawpaws	Bluffline	Fall	0.7000	12.0	-
Squash	Floodplain	Fall	3141.8400	26.4	-
Sunflower Seeds	Floodplain	Fall	315.0000	410.0	417.6
Tubers	Floodplain	Fall	7.8247	60.0	85.0
Viburnum Seeds	Bluffline	Fall	0.3637	28.0	46.0
Tubers	Floodplain	Winter	4.9270	60.0	85.0

morels to other animals and insects, an estimate of 500 gm/ha is proposed for the potential yield for morel harvesting, the figure presented in Table 1.

Sunflowers were cultivated in the Green River drainage area and other portions of the Midwest, by the terminal Late Archaic period (Asch and Asch 1985; Watson 1985; Yarnell 1978; Yarnell and Black 1985; Gremillion 1993), and judging from their occurrence in the archaeological records at sites like Salts Cave, Mammoth Cave, and Carlston Annis (Marquardt 1974; Marquardt and Watson 1983a, 1983b; Yarnell 1969; Gardner 1987) were well established cultivars in the Green River area by the Early Woodland period. Reidhead did not include sunflowers among the potential food resources in his site catchment analysis, an omission that is unfortunate because it reduces the comparability of the results of his study with those presented here.

The potential yield estimate for sunflower cultivation used in this study was derived in a manner similar to that used by Reidhead (1981) in estimating maize and squash yields. Starting with a conservative "third world" modern production rate of 900 kg of seeds produced per ha (Beard 1981:159), a figure of 630 kg/ha (30% less) was chosen as the potential Green River aboriginal production yield. Allowing for a 50% loss of the potential crop to insects, birds, disease and other causes, reduces the estimated average sunflower seed harvest to 315 kg/ha. The estimate for labor investment costs for planting, harvesting, processing, and storing sunflower seeds was assumed to be

comparable to that estimated by Reidhead for the aboriginal production of maize. That figure was 1315.3 workhours/ha (532.5 workhours/acre).

The remainder of the data presented in Table 1 was derived from Reidhead's estimates of productivity for a 15 mi^2 (3886.6 ha) catchment area in southeastern Indiana. Reidhead divided his catchment area into upland (27.6%), terrace and slope (30.8%), floodplain (34.9%), and open water (6.8%) and based his total potential harvest on the animal and plant species occurring within each zone. The same approach is adopted here.

Based on archaeological and ethnohistorical research, it is possible to identify particular native plant species that were economically important to the prehistoric inhabitants of the project area. Perhaps the most important of these were the hickory trees, which provided a dependable source of food in the form of nuts. Archaeological remains associated with Archaic, Woodland, and Mississippian sites within Mammoth Cave National Park (Carstens 1980; Gremillion 1990; Wagner 1978; Yarnell 1974a, 1974b), have demonstrated the use of hickory nuts as a primary source of food from 4000 B.C. to historic times. Hickory nuts are harvestable from September through November (Wagner 1978), can be stored for later use, and are high in calories and protein.

A recent study by Keller (1987) has demonstrated that pignut, mockernut, shagbark, and bitternut hickories produce, on the average, between 44 and 62 l (1.25 to 1.75 bu) of nuts per year. Allowing for a loss of 90% of the

annual nut harvest to competing animal species, insects, disease, and decay, still provides an estimated annual exploitable yield of 53 l (1.5 bu) of nuts per hectare if the hickory tree density equals just ten trees per hectare (four trees per acre). Assuming for the moment that the Oak-Hickory forests in just the upland ridge areas of the Park contained a density of ten trees per hectare, the potential annual hickory harvest within the Park boundaries would have been 485,035 l (13,775 bu) using the 90% loss rate. At an average weight of approximately 0.83 kg per l (29.5 kg per bushel) (Keller 1987), that amounts to over 406 metric tons of exploitable hickory nuts from the upland ridge areas. Reidhead (1981:190) has shown that meat weight accounts for approximately 30% of the total weight of hickory nuts, which means the upland ridges alone would have produced over 121 metric tons of nut meat using the 90% loss rate and 53 liter per hectare estimate.

Keller's study also demonstrated the productive potential of acorns from the oak trees common to the Mammoth Cave area. Although acorns generally require processing to remove the tannins which would otherwise make them unpalatable, they were used as a food source by the prehistoric inhabitants of the Mammoth Cave area (Wagner 1978; Gremillion 1990; Yarnell 1974a, 1974b). Keller's (1987:185) data indicate that most oaks currently found in the Mammoth Cave area would produce an average 31 l (0.875 bu) of acorns per tree. Again, allowing for a 90% loss of the acorn mast to natural causes, an estimated harvestable yield of 186 l (5.25 bu) of acorns per hectare is possible

if the average oak tree density equals just 60 trees/ha (24 trees per acre). Again, looking only at the upland ridge areas and the density figure of 60 trees/ha, the potential annual acorn harvest within the Park boundaries would have been 48,210 bu using the 90% loss rate. At an average weight of approximately 0.57 kg per l (20 kg/bu) (Keller 1987), that amounts to over 964 metric tons. Reidhead (1981:184) has shown that meat weight accounts for approximately 65% of the total weight of acorns, which means the upland ridges within the Park would have produced over 262 metric tons of nut meat.

These calculations are of limited value, of course, for computing acorn and hickory nut yields for determining such things as optimal resource potential since we lack the data for determining the actual prehistoric hickory and oak tree densities per hectare through time for each of the topographic zones of the Park. There also is no way of determining the exact percentage of the oak and hickory masts that would have been lost to animals, insects, and the like (cf. Reidhead 1981). These figures do show, however, that the potential of hickory nuts and acorns to provide a significant portion of the prehistoric diet was present and would have been available for human exploitation during the entire Late Archaic through Mississippian time periods.

Archaeological data gathered in the Park (Gremillion 1990; Wagner 1978; Yarnell 1974a, 1974b) have also identified other wild plant resources that were used prehistorically for food. These include black walnuts, hazelnuts, grapes, strawberries, blackberry, blueberry, pokeweed, purslane,

honey locust, viburnum seeds, sumac seeds, amaranth, knotweed, panic grass, maygrass, chenopodium, and tubers. Estimated harvest rates per hectare using 50 to 90 percent natural loss ratios have been prepared for the majority of these species in Table 1. These rates are derived from figures provided by Keller (1987), and Reidhead (1981), and have the same merit as those figures presented for hickory and acorn above. Among those species listed above, several are not included in Table 1 because harvestability and procurement cost estimates were not available.

Primary Faunal Resources

Faunal communities in Mammoth Cave National Park, as in any area, occupy those particular habitats that provide them with the food and shelter they need. For some animal species a seasonal shift from one area to another may occur. This is true, for example, for the white-tailed deer (*Odocoileus virginianus*) which concentrate in the uplands during the fall and winter where they can feed on the acorn mast and where they can shelter in the upland valleys (Smith 1975; Reidhead 1981). In the spring, deer move to the floodplain areas where they can browse on new shoots and grasses. Wild turkeys also have a similar seasonal round, concentrating in large numbers in the uplands in fall to feed on the nut masts, and dispersing in the spring and summer (Reidhead 1981). During all seasons of the year turkey prefer to roost near water, and this often results in wide ranging movements in a single day

(Reidhead 1981:151-152). Other animal species are less mobile and will inhabit a particular habitat year round. These include fish, freshwater mussels, and aquatic turtles, which are basically restricted to the Green and Nolin rivers. Some aquatic species such as crayfish and frogs have somewhat wider distributions and can also be found in intermittent streams and ponds.

It is possible then, like the wild plant resources, to indicate where and when various animal resources would have been available for exploitation by the prehistoric inhabitants of the Mammoth Cave area. In order to present this information more conveniently, Table 2 shows the seasonal availability of the various animal resources recovered archaeologically in the Park, and the most likely topographic zone in which they would be procured. The data in this table have been derived primarily from Reidhead (1981) and Smith (1975), with freshwater mussel data based on surveys conducted within the Park (Manzano and Prentice 1991). Those interested in how seasonality and density figures were derived by Reidhead (1981) and Smith (1975) should consult those sources. The mussel data were collected by Manzano and Prentice (1991) during the survey of nine transects across the Green River, each transect being 3.0 m wide. During a total of 4.75 workhours of collecting, 480 mussels representing 24 species were collected. Approximately 76% of these were either three ridge (*Amblema plicata*, 43%) or common muckets (*Actinonaias carinata*, 33%). The average meat weight for three ridge mussels was 56.5 gm; the average for muckets was 44.0 gm.

Table 2. Availability of Selected Wild Animal Resources in the Mammoth Cave Area.

Animal Species	Topographic Zones	Seasonal Availability	Estimated Harvest* (edible kg per ha)	Procurement Cost (workhours/100 kg edible) Fresh	Stored
Bear	All Terrains	Spring	0.09134	440	475
Beaver	River Edge	Spring	0.06754	170	205
Box Turtle	All Terrains	Spring	0.24700	600	-
Deer	Floodplain	Spring	1.12643	97	132
Duck	River	Spring	1.40000	4178	-
Fish	River	Spring	242.06000	28	63
Muskrat	River Edge	Spring	3.72223	480	543
Opossum	Floodplain	Spring	0.15438	269	304
Rabbit	All Terrains	Spring	0.15538	269	304
Raccoon	Floodplain	Spring	0.24932	395	430
Snapping Turtle	River	Spring	0.14158	179	-
Softshell Turtle	River	Spring	0.12551	274	-
Squirrel	All Terrains	Spring	0.09077	1176	1211
Terrapin	River	Spring	3.33450	165	-
Turkey	All Terrains	Spring	0.25987	248	283

Table 2. Continued.

Animal Species	Topographic Zones	Seasonal Availability	Estimated Harvest* (edible kg per ha)	Procurement Cost (workhours/100 kg edible) Fresh	Stored
Bear	All Terrains	Summer	0.09649	416	431
Beaver	River Edge	Summer	0.06754	170	205
Deer	Floodplain	Summer	1.14136	96	111
Duck	River	Summer	1.40000	4178	-
Fish	River	Summer	242.06000	28	63
Muskrat	River Edge	Summer	3.72223	480	543
Mussel	River	Summer	461.04000	40	-
Opossum	Floodplain	Summer	0.15438	269	284
Rabbit	All Terrains	Summer	0.15538	269	284
Raccoon	Floodplain	Summer	0.26141	378	398
Snapping Turtle	River	Summer	0.14158	179	-
Softshell Turtle	River	Summer	0.12551	274	-
Squirrel	All Terrains	Summer	0.12363	1000	1015
Terrapin	River	Summer	3.33450	165	-
Turkey	All Terrains	Summer	0.19580	290	305

Table 2. Continued.

Animal Species	Topographic Zones	Seasonal Availability	Estimated Harvest* (edible kg per ha)	Procurement Cost (workhours/100 kg edible) Fresh	Stored
Bear	All Terrains	Fall	0.12221	328	363
Beaver	River Edge	Fall	0.06754	170	205
Box Turtle	All Terrains	Fall	0.24700	600	-
Deer	Upland	Fall	1.35131	83	118
Duck	River	Fall	1.40000	4178	-
Fish	River	Fall	242.06000	28	63
Muskrat	River Edge	Fall	3.72223	480	543
Mussel	River	Fall	461.04000	40	-
Opossum	Floodplain	Fall	0.15438	184	219
Rabbit	All Terrains	Fall	0.20058	184	219
Raccoon	Floodplain	Fall	0.41553	242	277
Snapping Turtle	River	Fall	0.14158	179	-
Softshell Turtle	River	Fall	0.12551	274	-
Squirrel	All Terrains	Fall	0.15669	542	577
Terrapin	River	Fall	3.33450	165	-
Turkey	All Terrains	Fall	0.32368	146	181

Table 2. Continued.

Animal Species	Topographic Zones	Seasonal Availability	Estimated Harvest* (edible kg per ha)	Procurement Cost (workhours/100 kg edible) Fresh	Stored
Bear	All Terrains	Winter	0.10678	169	239
Beaver	River Edge	Winter	0.06754	170	205
Deer	Upland	Winter	1.24222	90	160
Duck	River	Winter	1.40000	4178	-
Muskrat	River Edge	Winter	3.72223	480	543
Opossum	Floodplain	Winter	0.15438	219	289
Rabbit	All Terrains	Winter	0.20058	219	289
Raccoon	Floodplain	Winter	0.33242	395	430
Snapping Turtle	River	Winter	0.14158	179	-
Squirrel	All Terrains	Winter	0.13400	634	704
Turkey	All Terrains	Winter	0.32368	146	216

From a potential food perspective, the most important mammal taxa now living in the Park include white-tailed deer, raccoon (*Procyon lotor*) opossum (*Didelphis marsupialis*), rabbit (*Sylvilagus floridanus*), groundhog (*Marmota monax*), squirrels (*Sciurus* spp.), and beaver (*Castor canadensis*). These species make up the bulk of the mammal remains recovered from prehistoric sites in the Park (Carstens 1980; Duffield 1974; Prentice 1993). Other mammals inhabiting the area include muskrat (*Ondatra zibethica*), red fox (*Vulpes fulva*), gray fox (*Urocyon cinereoargenteus*), and striped skunk (*Mephitis mephitis*).

Several mammal species that were present in the Park area before the arrival of White settlers have since been exterminated. These include black bear (*Ursus nigra*), wolf (*Canis lupus*), porcupine (*Erethizon dorsatum*), and mountain lion or panther (*Felis concolor*).

The most important bird species recovered archaeologically are turkey (*Meleagris gallopavo*) and ducks (Anatidae). Of the identifiable avian remains recovered from prehistoric sites, turkey predominates. Other birds currently found in the Park that were available for prehistoric exploitation include bobwhite quail (*Colinus virginianus*), and mourning dove (*Zenaida macroura*). Migratory passenger pigeons (*Ectopistes migratorius*) would also have been present seasonally for exploitation, but they have since become extinct due to historic overhunting.

The most common reptiles occurring in the archaeological record are turtles, particularly the box turtle (*Terrapene carolina*). This species is commonly found throughout the Park today. Members of the mud turtle group (*Kinosternon* spp.) and snakes also are found regularly in prehistoric sites in the Park.

A diverse range of freshwater mussel species within the Green and Nolin rivers provided a dependable food source for the prehistoric inhabitants of the area. Surprisingly, although freshwater mussels occur at many sites in the Park, they generally occur in relatively few numbers. When they do occur, there does not appear to be any prehistoric selection toward collecting any particular species of mussels. The following mussel species have been recovered from archaeological deposits: rabbitfoot (*Quadrula cylindrica*), monkey face (*Quadrula metanevra*), spike (*Elliptio dilatata*), purple wartyback (*Cyclonaias tuberculata*), three ridge (*Amblema plicata*), pocketbook mussel (*Lampsilis ovata*), common mucket (*Actinonaias carinata*), elephant ear (*Elliptio crassidens*), fanshell (*Cyprogenia irrorata*), subrotundra (*Fusconaia subrotundra*), pleurobema (probably *Pleurobema coccineum*, *Pleurobema clava* and *Pleurobema cordatum*), *Ptychobranchus* sp., crackling pearly (*Hemistena lata*), cat's claw (*Epioblasma* sp.), black sandshell (*Ligumia recta*), pink heelsplitter (*Potamilus alatus*), and sheepnose (*Plethobasus cyphyus*). Edible gastropods also harvested from the rivers prehistorically include *Elimia* sp., *Anculosa* sp., *Lithasia* sp., *Pleurocera* sp., and *Campeloma* sp.

The freshwater mussels and aquatic gastropods recovered from archaeological contexts in the Park are all shallow water species that can be gathered relatively easily during periods of low water flow. As a part of the Mammoth Cave National Park Archeological Inventory Project (MCNPAIP), Bruce L. Manzano and I conducted a series of transect surveys across different sections of the Green River at different seasons of the year (late spring, summer, fall) in order to estimate population numbers, to collect samples for seasonality studies, and to collect nutritional information on three species of freshwater mussels. As a result of these studies, we conservatively estimated a total mussel population of roughly 16,000,000 (61,472 mussels/ha) for those stretches of the Green and Nolin Rivers contained within the boundaries of the Park (Manzano and Prentice 1991). These studies demonstrated the ease with which mussels could be gathered during the summer and fall when low water and warm weather made wading in the cool river waters possible. At these times of the year it was possible for a single person to collect 101 mussels per hour on average by simply feeling about with hands and feet in the substrate of the river. In the winter and early spring, however, extremely cold water temperatures and frequent flooding made mussel collecting extremely difficult, so much so that it was not possible to collect mussels from the river safely during several winter attempts to do so.

The nutritional studies conducted on the collected mussels were performed by National Environmental Testing, Inc., of Chicago. Samples of

the two most common mussels currently found in the Park, three ridge mussels (*Amblema plicata*) and common muckets (*Actinonaias carinata*), were collected in May, August, and October and were submitted for nutritional analysis. The results of the analyses presented in Table 3.

Many edible fish species, including catfish (Ictaluridae) and bass (*Micropterus* sp.), currently found in the waters of the Green and Nolin rivers, were available to the prehistoric inhabitants of the area. Other species of fish presently inhabiting the river that would have been prehistorically exploitable include muskellunge (*Esox masquinongy*), bluegill (*Lepomis macrochirus*), freshwater drum (*Apolodinotos grunniens*), gizzard shad (*Dorosoma cepedianum*), and gar (*Lepisosteus* sp.). Surprisingly, however, few fish remains have been recovered from archaeological contexts in the Park. The few fish remains that were recovered during the MCNPAIP that could be assigned to species included only catfish (Ictaluridae) and gar (*Lepisosteus* sp.). The remaining specimens could only be identified as fish. There are several possible explanations (e.g., poor preservation, recovery technique, site seasonality, dietary avoidance, etc.) for the paucity of fish in the archaeological record. As we shall see in later sections of this treatise, the paucity of fish remains is probably a function of seasonality.

Table 3. Results of Nutritional Analysis of Mussels Collected From the Green River.

Species	Month of Collection	Protein (%)	Fat (%)	Moisture (%)	Ash (%)	Fiber (%)	Carbo-hydrates (%)	Calories
A. plicata	May	8.17	0.510	81.0	2.41	0.219	7.91	69.0
	August	9.34	0.380	78.5	2.32	0.250	9.46	79.0
	October	7.41	0.432	84.0	2.22	0.220	5.94	57.0
A. carinata	May	9.94	0.540	81.2	4.11	0.171	4.21	61.0
	August	8.56	0.590	81.5	2.57	0.320	6.78	67.0
	October	7.25	0.345	86.5	2.77	0.202	3.13	45.0

Species	Month of Collection	Calcium (mg)	Iron (mg)	Phosphorus (mg)	Potassium (mg)	Sodium (mg)
A. plicata	May	565.0	26.40	370.0	33.80	26.50
	August	795.0	22.20	436.0	38.20	19.80
	October	652.0	22.90	397.0	20.40	22.00
A. carinata	May	560.0	28.40	661.0	37.80	27.50
	August	910.0	15.90	458.0	32.20	24.50
	October	930.0	16.60	477.0	17.00	34.00

Summary Observations

The stability of the dominant forest zones and their concomitant floral and faunal resources since roughly 4000 B.C., provides the archaeologist with an excellent opportunity to study the ways in which human social groups evolved in a relatively unchanging environment. From approximately 4000 B.C. until the arrival of Europeans in the Americas, the natural environment apparently provided the same resources from which to select materials for obtaining food, tools, clothing, and shelter. Those seeking to account for cultural change during this broad time frame must look primarily, therefore, at human factors as the variables with environmental factors acting as constants. Approaching the problem from a Marxist economic perspective, I hope to show that decision-making regarding subsistence production formed the basis for the prehistoric settlement patterns exhibited in the study area. Before turning to the theoretical examination of subsistence and settlement patterns, however, the history of previous archaeological investigations in the Park and the results of those investigations will be discussed. The historical section will be followed by a summary of the results of the Mammoth Cave National Park Archeological Inventory Project survey.

PREVIOUS ARCHAEOLOGICAL RESEARCH

Introduction

Archaeological investigations in Mammoth Cave National Park have had a long history and have gone through several phases of investigative focus that reflected the interests and theoretical concerns of the times. While it is possible to assign the different phases of past archaeological investigations in the Park to broad categories reflecting national trends in archaeological pursuits, such as those devised by Willey and Sabloff (1980), it was deemed more appropriate to categorize Mammoth Cave archaeology in terms of phases with more local applicability. These phases can be categorized as: (1) the Pre-Park Years (1800-1941); (2) the Early Park Years (1941-1962); (3) the Cave Research Years (1963-1974); and (4) the Survey Years (1974-1990).

The Pre-Park Years (1800-1941)

During the Pre-Park Years, the focus of archaeological investigation in the Mammoth Cave area was primarily on Mammoth, Salts, and other caves and the unique artifactual assemblages preserved within them. It was during these early years that Rafinesque (1824), Collins (1848, 1874), Putnam (1875,

1976), Young (1897, 1910), Moore (1916) and others concerned themselves with enumerating the variety of sites in the area and the types of artifacts collected from them. It was also during this time period that most of the famous "mummies" and other significant finds of Mammoth and Salts Caves were found and exhibited (Meloy 1968). Many prehistoric artifacts from the caves and surrounding areas were collected as souvenirs for sale to the public and many of the impressive finds eventually made their way to museum collections in the eastern United States. Hundreds more artifacts were destroyed in bonfires lit by the cave guides in order to illuminate the caves for tourists.

The amassing of hundreds of Mammoth Cave artifacts by John M. Nelson epitomized the nature of the archaeological pursuits during the Pre-Park Years. Between 1894 and 1942, John M. Nelson and his two sons collected artifacts from Mammoth Cave and other sites in the surrounding area. His collection technique included digging for artifacts as well as surface collecting. In 1942 this collection was purchased by the Mammoth Cave National Park Association and donated to Mammoth Cave National Park (Carey 1942, Schwartz 1958b). The collection has been subsequently cataloged by Carey (1942), and analyzed and assessed by Schwartz (1958b), by Kerley, Muething, and Carstens (1978), and by Carstens (1980) as a means of assigning temporal placement to these occupations and of identifying the types of activities performed at the sites. More recently, Western Kentucky University archaeologist Terry Langford has been contracted by the Park

Service to reanalyze and catalog the Nelson Collection. Unfortunately, the reliability of the site provenience assigned to these materials is highly suspect, and the temporal assignment given to sites on the basis of Nelson's collection is untrustworthy.

The arrival of Nels C. Nelson in the Mammoth Cave area in 1916 signaled the first "scientific" archaeological excavations in what was to become Mammoth Cave National Park. Nelson, a professional archaeologist from the American Museum of Natural History, visited the Mammoth Cave area in May and November of 1916. In 1913 the management of Mammoth Cave had donated many artifacts from Mammoth and Salts Caves to the Museum; the Museum was now interested in learning where and under what conditions such materials were preserved (Nelson 1917:4; Schwartz 1958h:1).

During his visit, Nelson recorded the locations of 23 historic and prehistoric sites located within the present Park boundaries; among them: Mammoth Cave Fields (Park site number MACA-51), Mammoth Cave Ferry #1 (MACA-52), Nelson's Rockshelter (MACA-82), Salts Sink Surface (MACA-73), Salts Cave Interior (MACA-89), Mammoth Cave Ferry #2 (MACA-140), Mammoth Cave (MACA-215), Dixon Cave (MACA-219), Moonshiners' Cave (MACA-223), Curtis Cave Field (MACA-226), Bone Cave (MACA-229), Haunted Cave (MACA-230), White Cave (MACA-231), and Houchins Valley Quarry (MACA-881). Although it has yet to be confirmed by more complete historical documentation, it appears that the following sites were also included among

Nelson's list of sites: Great Onyx Cave Fields (MACA-53), Owl Cave (MACA-93), Cedar Sink Rockshelter (MACA-97) (Owl Cave and Cedar Sink Rockshelter are probably Nelson's site 12, simply referred to as "Cedar Sink"), Hollow Creek (MACA-131), Adwell Springs (MACA-212), and Great Onyx Cave (MACA-232). Eventually these sites were included within the Park boundaries and are now currently listed on the Park's Cultural Sites Inventory.

In addition to the sites enumerated above, Nelson identified two rockshelters on the Napa farm, which he described as being located on the north bank of the Green River approximately two miles upstream from Mammoth Cave. This description places the two rockshelters in the vicinity of Big Hollow where three known rockshelters have been recorded (MACA-96, MACA-158, and MACA-159). Nelson identified two more open site/chert scatters in the Park, one below Bedquilt Cave and one in Eaton Valley, south of Three Springs Pumphouse. The location and nature of these sites is unknown at this time.

While conducting his field work in the area, Nelson collected artifacts from the surfaces of many of his reported sites and included the descriptions of specific materials from four sites--Mammoth Cave Field (MACA-51), Mammoth Cave Ferry #2 (MACA-140), Curtis Cave Field (MACA-226) [Nelson included the Houchins Valley Quarry site (MACA-881) as part of MACA-226], and Salts Sink Surface (MACA-73)--in his published report, *Contributions to the Archaeology of Mammoth Cave and Vicinity, Kentucky* (1917). He also

conducted excavations at two sites: Nelson's Rockshelter (MACA-82) and Mammoth Cave (MACA-215), and he included accounts of his findings at both sites in his 1917 report.

Nelson's work in the Mammoth Cave area is important in several ways. First, it was conducted at a time when a significant portion of the Park was cleared of forest and ground surface visibility was better than it is today. This allowed Nelson to identify open air sites in Eaton and Houchins Valley that otherwise would not be recorded today. Second, it represented the first study to recognize two distinct prehistoric cultural-historical periods in the area. Nelson (1917:69) concluded on the basis of his excavations and survey that there had been an earlier peoples who lived by subsisting on the natural resources of the land, and a later people who practiced agriculture. Third, his excavations in the Vestibule of Mammoth Cave (MACA-215), provide us with the best information we have (limited though it may be) of the various prehistoric occupations in this portion of the site. Fourth, Nelson (1917:68) was the first to suggest that cannibalism may have been practiced by the inhabitants of the Mammoth Cave area, an idea later embraced by Robbins (1974) and Watson (1974).

Fowke was the next archaeologist to visit the Mammoth Cave area. As a representative of the Bureau of American Ethnology, Fowke came to the Mammoth Cave area sometime around 1919 as part of the BAE's program for inventorying cave sites in the eastern United States. Fowke's (1922) report

listed the major caves in the area, including Salts Cave (MACA-89), Mammoth Cave (MACA-215), Dixon Cave (MACA-219), White Cave (MACA-231), Colossal Cave (MACA-227), Proctor Cave (MACA-228), and Haunted Cave (MACA-230).

Toward the end of the Pre-Park period, professional archaeologists such as Webb and Funkhouser (1932) and Pond (1935a, 1935b, 1935c, 1937) began more systematic treatments of the archaeological data. Still, their treatments of these resources were more descriptive and episodic than substantive. As part of a county by county "mail in" survey of prehistoric archaeological sites in Kentucky, Webb and Funkhouser (1932) reported the locations of eight sites in Edmonson County that are presently located within the boundaries of Mammoth Cave National Park. These sites are: the rockshelter at Sand Cave (MACA-74), Indian Hill-Top (MACA-78), Nelson's Rockshelter (MACA-82), Salts Cave Interior (MACA-89), Mammoth Cave Ferry #2 (MACA-140), Mammoth Cave (MACA-215), Curtis Cave Field (MACA-226), and Haunted Cave (MACA-230). In addition to these sites, Webb and Funkhouser also reported the location of "A group of mounds on the property of the Kentucky Rock Asphalt Company across the Nolin River from Kyrock. These mounds are situated on a knob known as 'Whistle Mountain' and have never been explored" (Webb and Funkhouser (1932:107). The existence of these possible mounds within the boundary of the Park will receive further discussion below.

Pond's work in Mammoth Cave National Park focused on the recovery and investigation of the desiccated body known as Lost John (Pond 1935a,

1935b, 1935c, 1937). Alonzo Pond, a National Park Service Junior Archeologist, was called to Mammoth Cave on June 10, 1935, to examine the corpse of the prehistoric miner after it was discovered by cave guides Lyman Cutliff and Grover Campbell. During his stay at Mammoth Cave, Pond spent several days examining some of the local rockshelters and other sites in the area (1935b, 1935c). Two unpublished manuscripts written by Pond (1935a, 1935b), indicate that he visited Nolin/Second Creek Rockshelter (MACA-18), Cubby Cove Rockshelter #1 (MACA-24), Indian Hill Rockshelter - East (MACA-72), Indian Hill - Top (MACA-78), and Salts Cave (MACA-89). Although Pond was aware of the need to do more archaeological work outside of the caves, little was done along these lines until many years later.

Because Pond's primary aim was the recovery and interpreting of Lost John's body, most of his time was spent investigating prehistoric mining practices in Mammoth Cave. Pond's observations regarding prehistoric mining practices within Mammoth Cave included the pecking of gypsum crust from exposed rock surfaces using expedient tools, the digging for gypsum crystals (selenite) in sedimentary deposits with digging sticks, the sorting of crystals from other rocky debris at sorting beds within the cave passages, and the use of small trees as climbing ladders (Pond 1935a, 1935b, 1935c, 1937). Toward the examination of the latter, Pond obtained corings from an aboriginal ladder in Blue Spring Avenue and another in Black Chambers. Hoping to date the ladders through dendrochronology, Pond sent the corings along with borings

taken from 13 cedar trees in the Mammoth Cave area by Noel B. Wysong to Florence Hawley. In a letter dated February 13, 1936, Hawley informed Pond that the cores were undatable because too few growth rings were present from the aboriginal ladder corings (letter on file, Mammoth Cave National Park).

Georg K. Neumann (1937, 1938) later assumed the task of analyzing the remains of Lost John along with those of a primary burial recovered by workmen near the entrance of Mammoth Cave in 1930. This "vestibule" burial consisted of an adult female, roughly 18 to 19 years of age, buried in a flexed position in an oval grave. The grave was lined with a grass or fiber matting that was said to have been burned, but no other materials were associated with the burial. Neumann's analysis of Lost John indicated that the unfortunate miner had been approximately 161 cm (5' 3.5") tall and somewhere between 41 and 51 years old when he died.

The Early Park Years (1941-1960)

With the establishment of Mammoth Cave National Park in July, 1941, the emphasis of archaeological research in the Park changed from one of a primarily amateur/collector interest to a focus on prehistoric sites and artifact collections inventory. It was during these Early Park Years that Carey (1942) was hired to catalog the John Nelson Collection. Dr. Henry A. Carey was employed from June 1 to November 1, 1942, to catalog the collection and obtain information on artifact provenience. As a result of this research, the

provenience of many artifacts was attributed (based on Nelson's memory) to eight sites within the Park: Mammoth Cave (MACA-215), Mammoth Cave Ferry #1 (MACA-52), Salts Cave Interior (MACA-89), Green River Fields (MACA-104), Salts Sink Surface (MACA-73), Sell's Farm/Salts Cave Fields (MACA-92), Indian Hill - Top (MACA-78), and Indian Hill Rockshelter - East (MACA-72). Unfortunately the proveniences attributed to the items in the collection are very suspect, and therefore of limited value.

On November 13, 1946, a trail crew repairing the trail near the entrance to Mammoth Cave uncovered an Indian burial located along the south wall of the vestibule approximately 35 ft inside the iron gate. The burial was not located during the actual repair of the trail, but was uncovered during the lunch hour by two members of the trail crew who were interested in seeing if burials were present in the areas where thumping on the cave floor produced a hollow sound. With the approval of their supervisor, the two dug in two areas that produced the hollow sounds and, partly true to their predictions, found the remains of a human burial in one of the locations. In the other location, animal bones were encountered. The bones were subsequently reburied and Regional Archeologist Jean ("Pinky") Harrington was contacted regarding the finds. Harrington arrived at the cave on November 21 to investigate. He found the human burial associated with "some sort of grass or fibre matting," but no other materials. The animal bones were determined to be those of a "small mammal" (Harrington 1946).

The human burial investigated by Harrington was similar in some ways to the "vestibule" burial recovered nearby in 1930 and described by Georg K. Neumann (1937, 1938). Each individual was buried on a fiber mat without other accompanying artifacts; both were apparently placed in shallow pits; and both burials were buried in the same general area. The location of the 1930 vestibule burial had been marked with a cross on the ceiling of the cave at a point roughly 44 ft inside the Vestibule gate. This location places the 1930 burial roughly 9 ft from the 1946 burial (Harrington 1946).

In 1957, Douglas W. Schwartz began the first of several projects oriented towards an inventory of the archaeological resources within the Park. Schwartz apparently spent the greatest amount of his field time examining those sites previously described in the archaeological literature and those reported to him by local informants (Schwartz 1958a, 1958b, 1958d, 1958h; Sloan and Schwartz 1960). He also spent considerable time examining the artifacts from the Nelson Collection and from Salts and Mammoth Caves (Schwartz 1958b, 1958c, 1958d, 1958e, 1958f, 1958g).

In 1958, Schwartz (1958d) reported the locations of 16 known "sites" within the Park. These sites consisted of six open sites (four upland, two bottomland), three rockshelters, the entrance and interior of Salts Cave, and the Vestibule and four interior sections of Mammoth Cave. Schwartz (1958d:21-24) also described 27 "unsurveyed" site locations that he had yet to confirm by field work.

In 1960, after additional field work, Sloan and Schwartz (1960) were able to report the locations of 38 "sites" confirmed by their fieldwork. These sites consisted of nine open sites (four bottomland, five upland), 15 rockshelters, the interior of Salts Cave, and the Vestibule and 12 interior locations within Mammoth Cave. These resources are now listed as 25 archaeological sites on the Park Service's Cultural Sites Inventory with the 12 interior locations within Mammoth Cave (MACA-215) treated as contributing elements to this single, albeit extensive, cave site.

One of Sloan and Schwartz's (1960) "confirmed" sites, Mc 2, has yet to be identified. The Mc 2 site was described as follows:

> The Mc 2 site number is now being used to designate a preserved Paleoindian site on the western edge of the Park. A fluted point fragment was found here and given to the Mammoth Cave Park Museum. This artifact came from a rock shelter above the Nolin River on the old Webb farm, but the exact location was not known nor was there any other information available concerning other artifacts at the site [Sloan and Schwartz 1960:17].

According to Sloan and Schwartz's description of Mc 2, the site is apparently located somewhere in the Second Creek area of the Park. The "old Webb farm" they referred to is probably MACA-266 or a site nearby. Several rockshelters in that general area have been recorded, and it is possible that one of these sites is Sloan and Schwartz's Mc 2. Further documentary research may be able to pinpoint the exact location of Mc 2, but it will rely on documentation that has not surfaced as yet.

In addition to the 38 confirmed sites listed in 1960, Sloan and Schwartz (1960:29) also recorded 19 unconfirmed sites in the Park: five of these were site locations which they were unable to visit due to "a variety of reasons" (Sloan and Schwartz 1960:28), and 14 were locations that they were able to visit, but due to dense vegetative growth were unable to locate artifactual materials. Of these 19 unconfirmed sites, all but one are now listed on the Cultural Sites Inventory. The remaining unlisted site is Location 5 (Sloan and Schwartz 1960:29), which consists of a group of "mounds" first reported by Webb and Funkhouser (1932:107). These mounds are located on the bluff crest across the Nolin River from the town of Kyrock, and have been assigned state site number 15Ed7. These "mounds" appear as three small elevated areas at the 700' contour interval on the USGS 7.5' Nolin Lake, KY. Quadrangle (1966, Photo-revised 1982) at UTM coordinates E565800 N4124000. It is possible that these "mounds" are natural elevations on the bluff crest. Because the "mounds" have not been examined and confirmed as having a cultural origin, they will not be considered as a site(s) in this study.

The Cave Research Years (1961-1970)

The major emphasis toward simply identifying and inventorying cultural resources in Mammoth Cave National Park during the Early Park Years came to an end in 1961 when the Cave Research Foundation began sponsoring archaeological investigations in Salts Cave: carbon dating soot deposits within

the cave (Benington et al. 1962). It was with this project that the Cave Research period began and Patty Jo Watson initiated her long interest and major accomplishments in Mammoth Cave area archaeology. It was also during the Cave Research Years that the archaeological emphasis changed from the enumeration of culture traits toward the understanding of cultural change and process. As a result of Watson's and her colleagues work in the caves at Mammoth Cave National Park, we are in a better position to evaluate: (1) the adoption of horticulture during the Archaic period; (2) the shift during the Late Archaic/Woodland periods from a hunting and gathering economy to one that relied considerably on domesticated plants; (3) prehistoric mining activities within the cave systems of the Park; and, (4) changes in prehistoric ceremonial practices during the Archaic and later time periods. This is due in large part to the data gathered during excavations in the Vestibule and interiors of Salts Cave (MACA-89), at Salts Sink Surface (MACA-73), and at Sell's Farm (MACA-92) (Watson 1969, 1974).

Excavations within Salts Cave were conducted in August, 1963, under the supervision of Robert Hall and Patty Jo Watson (Watson 1969, 1974:71). These excavations consisted of the removal of 8 m^2 from two units designated Unit A and B. Unit A was a 2-by-2 m square excavated to a depth of 1.4 m; Unit B was a 2-by-2 m square excavated to a depth of 30 cm. The two excavation units (A and B) were excavated within the upper passages of the cave (referred to as Upper Salts) and some 70 representative surface artifacts

were collected from Upper, Middle, and Lower Salts passages (Watson 1969:5). These included cane torch remains, part of a wooden platter (?), mussel shells, limestone mining tools, a full grooved stone maul, sandal fragments, wood, bark, leaves, and squash and bottle gourd fragments. Forty-seven fecal samples were also collected from the cave (Watson 1969:Table 1).

Watson also conducted excavations in Salts Cave Vestibule from 1969 to 1971 (Watson 1974:71). The excavation units were designated Units C, D, E, F, F Extension, G, H, and J. The eight covered a total area of 29 m^2 and were located primarily near the north wall of the cave approximately 45 m from the present cave entrance. Unit D was the exception, being placed along the south wall of the cave. During her 1969 investigations at Salts Cave, Watson and her crew also conducted pedestrian surveys in the Park. While surveying both banks of the Green River between Dennison Ferry and Three Sisters Island, Watson's crews found a few chert artifacts associated with MACA-35, and at Indian Hill, Watson's crew members noted artifactual materials on top of the hill (MACA-78), but none in the rockshelters surrounding it. Watson's 1969 crew also walked the southern floodplain of the Green River between Great Onyx Cave and Three Sisters Hollow without finding any evidence of a site.

Perhaps the most significant results of the work of Watson and of her colleagues in Salts Cave is the information gathered concerning prehistoric dietary practices and the early domestication of plants in the Green River area.

Yarnell's (1969, 1974a, 1974b) analysis of the plant remains recovered from the paleofeces taken from the cave, the intestinal contents of the desiccated human remains known as Little Al, and the Salts Cave Vestibule flotation samples indicates a diet high in hickory (*Carya* sp.) nuts and starchy seeds--sunflower (*Helianthus annuus*), marshelder (*Iva annua*), goosefoot (*Chenopodium* sp.), maygrass (*Phalaris caroliniana*), and amaranth (*Amaranthus* sp.). The wild and domesticated plant foods represented in the Salt Cavers' diets suggests use of the cave primarily in the late fall through spring months (Yarnell 1969:50).

Although Watson's work in Salts Cave provided valuable information regarding the adoption of Late Archaic and Early Woodland horticultural practices, these practices were in relationship to a very specialized range of activities associated with mineral extraction in caves. How representative it was of the general lifestyles of the prehistoric cavers was left unanswered. In an attempt to address this question, Watson and her colleagues initiated additional work in the Big Bend area of the Green River in what was to become known as the Shell Mound Archaeological Project.

Located roughly 60 km down stream from Mammoth Cave, the Big Bend area of the Green River valley is significantly different in topography and has a greater range of archaeological site types than is found in the Mammoth Cave area. Here the floodplains are expansive, over 2 km (1.2 mi) wide in places. The area and sections of the river down stream are possibly best known archaeologically for the "Shell Mound Archaic" sites (e.g., Indian Knoll,

Carlston Annis, and Read) that were first investigated by C. B. Moore (1916), and extensively excavated by Webb and Haag (Webb 1950a, 1950b, 1974; Webb and Haag 1939, 1940, 1947). More recent excavations directed by Marquardt and Watson (1983a, 1983b) have added archaeobotanical information to the faunal and lithic data gained from these earlier investigations.

While shell-midden sites are common in the Big Bend and lower stretches of the Green River, they are exceedingly scarce upstream of the Big Bend area. Excavations at the shell-midden sites have contributed greatly to the views currently held by archaeologists regarding the social organization, exchange systems, and subsistence practices of the mid-southeast during the late Middle and Late Archaic periods (Jefferies 1990b; Rolingson 1967; Smith 1986; Steponaitis 1986; Watson 1985; Winters 1968, 1969; Thieme 1991).

Investigations at Indian Knoll (15 Oh 2) under the direction of Webb in 1939 as part of the Works Progress Administration (WPA) produced 1178 burials and over 55,000 artifacts (Webb 1974:122, 137). Indian Knoll had been previously dug into by C. B Moore in 1915, when he removed a reported 298 human skeletons (Moore 1916). Excavations by Webb at the site also recovered Middle Archaic through Mississippian period artifacts. Projectile point types included Kirk (Early Archaic), Big Sandy II/Raddatz (Middle Archaic), Matanzas, Elk River Stemmed, and Ledbetter Stemmed (Late Archaic), and Early Woodland stemmed points (Rolingson 1967; Webb 1974; Watson 1985; Justice 1987). Pottery collected primarily in the upper 45 cm (1.5 ft) of the site

included shell-tempered types (Mississippi Plain, Bell Plain, McKee Island Cord Marked, Kimmswick Fabric Impressed), limestone-tempered types (Rough River Simple Stamped), and grog-tempered types (Mulberry Creek Cord Marked) (Haag 1974). The major occupation of the site has been defined by Rolingson (1967) as the Indian Knoll phase, and has been roughly dated to between 2500 and 1500 B.C. based on artifact typological comparisons and radiocarbon dating (Rolingson 1967; Watson 1985).

Faunal materials collected at the Indian Knoll site included deer (97.6% of mammal bone), dog, raccoon, opossum, groundhog, squirrel, beaver, fox, bear, bobcat, rabbit, skunk, mink, chipmunk, turkey (83.4% of bird bone), goose, turkey vulture, sandhill crane, box turtle, aquatic turtle, drum, and buffalo fish (Webb 1974:334-339). Tools and debris collected by Webb that were indicative of activities performed at the site included fire-cracked rock (hot-rock cooking), hoes (digging, gardening?), pestles, nutting stones and charred nutshells (nut processing), axes (tree felling), fishhooks (fishing), freshwater gastropod and bivalve shells (shellfish collecting), hammerstones, cores, flakers, flakes (lithic tool production), hafted scrapers (hide preparation), and projectile points, atlatl hooks, atlatl weights, and faunal debris (hunting).

WPA work at Carlston (Carlson) Annis Mound (15 Bt 5) in 1939 under the direction of Webb produced 390 burials and a collection of artifacts very similar to Indian Knoll in overall composition (Webb 1950a; Justice 1987). Projectile point types included Big Sandy II/Raddatz, Saratoga, Ledbetter,

Adena, and Mississippian Triangular. Woodland and Mississippian pottery were also recovered. Other common artifact types included fire-cracked rock, hoes, pestles, nutting stones, axes, fishhooks, gorges, freshwater gastropod shells, bivalve shells, hammerstones, cores, flakers, flakes, hafted scrapers, atlatl hooks, and atlatl weights. Faunal materials were dominated by deer with raccoon, fish, bird, and box turtle also present.

As part of the Shell Mound Archaeological Project, Marquardt and Watson directed excavations at Indian Knoll (15 Oh 2), Carlston Annis shell mound (15 Bt 5), and Bowles shell mound (15 Oh 13). Marquardt and Watson's and their colleagues' work (Crawford 1972; Marquardt and Watson 1983a, 1983b; Stein 1982) at Carlston Annis demonstrated that the shell mound had been covered by a "shell-free midden" of cultural origin. Both were accretional deposits resulting from the accumulation of soil and plant and animal residues transported to the sites by the human occupants (Stein 1982). Dating of hearths and charcoal levels from various levels in the site indicated an occupation spanning roughly 3400 to 1350 B.C. within the shell midden zone (Levels 5 through 20) (Marquardt and Watson 1983a, 1983b). Within this shell midden layer the most common shellfish species were inhabitants of riffle/run, shallow water environments (Marquardt and Watson 1983a:120).

Of greatest importance, the excavations at Carlston Annis revealed a plant exploitation pattern different from that found at Salts and Mammoth Cave. Instead of a plant assemblage dominated by domesticates, the faunal

material consisted primarily of hickory nuts (90%) with minor amounts of acorn, black walnut, and seeds of blackberry (*Rubus* sp.), grape (*Vitis* sp.), honey locust (*Gleditsia triancanthos* L.), knotweed (*Polygonum* sp.), persimmon (*Diospyros virginiana*), elderberry (*Sambucus* sp.), foxtail-grass (*Setaria* sp.), panic-grass (*Panicum* sp.), wild plum (*Prunus* sp.), cinquefoil (*Potentilla* sp.), cleavers (*Galium* sp.), hazelnut (*Corylus* sp.), and possible sunflower (*Helianthus annuus* L.) rounding out the rest of the assemblage (Crawford 1982). Fragments of squash (*Cucurbita pepo* L.) rind were also recovered. This, in addition to the large quantity of fish and mussel shell remains contained in the shell mound, indicates that the site was occupied primarily during the summer and early fall (Marquardt and Watson 1983b:330).

Essentially the same plant species in roughly the same proportions were recovered by Marquardt and Watson at the nearby Bowles site although only 26 taxa were represented. Several plant species not found at Carlston Annis were recovered from the site: hackberry (*Celtis* sp.), wild bean (*Strophostyles* sp.), wild rice (*Zizania aquatica* L.), purslane (*Portulaca* sp.), and tickclover (*Desmodium* sp.). Again, a summer and early fall occupation of the site appears to be indicated.

The primary purpose of discussing the nature of the shell midden sites in the Big Bend area at this juncture is to point out the differences in the artifact assemblages recovered from these shell mound sites located just 60 km (37 mi) down river from those sites located near Mammoth Cave. The

importance of these differences will receive greater attention later in the dissertation during the discussion concerning the overall settlement pattern of the area and the influence seasonality and scheduling of economic tasks had in the development of these apparent patterns. For the moment, let us return to the history of archaeological investigations in the study area proper.

Two instances of limited excavations were carried out in Mammoth Cave (MACA-215) at roughly the same time Watson was pursuing her work in Salts Cave. The first of these was conducted in 1967. These investigations were associated with the bat research of biologist Dr. John S. Hall of Albright College. Dr. Hall was accompanied by National Park Service Archeologist George R. Fischer during three days of excavations in April, 1967, in the Chief City section of Broadway passage in order to recover bat bones. During the excavations prehistoric sandals and other textile fragments were recovered.

The other instance of excavations in Mammoth Cave (MACA-215) occurred in 1968. According to field notes and correspondence on file at the Southeast Archeological Center (Accession #654), human burial remains were unearthed by workers of Gray Construction Company on September 18 while relocating the trail near the cave entrance. Park Service Archeologist George R. Fischer arrived at the site on September 20 to examine the find. According to Fischer's field notes, the remains appeared to be a badly disturbed single primary burial that had probably been disturbed by previous trail constructions. The remains included ribs, long bones, vertebrae, and

phalanges, but no skull was present. No artifacts were found in direct association with the burial, but animal bones and other materials were recovered in the vicinity. Fischer excavated an area roughly two feet on either side and below the skeleton without uncovering further evidence of burials. On October 4, 1968, Robert A. Burns sent Fischer additional human remains and other artifacts that had been found in loose trail fill in an area adjacent to where Fischer had recovered the disturbed burial. These materials included portions of a human skull, part of a deer jaw, a horn tip, and a round stone.

Patricia S. Boyett (1973) later analyzed the skeletal material recovered by Fischer from the cave entrance. She has determined that the remains are those of a male (20-25 yrs of age), but that an adult female is also represented by a right clavicle and the proximal end of a right femur. The faunal material recovered in the vicinity of the burial included deer (*Odocoileus virginianus*) and cow (*Bos taurus*). One possible digging stick and 132 mussel shell fragments were also represented in the collection.

The Survey Years (1970-1990)

Following the passage of the National Historic Preservation Act in 1966, the National Environmental Policy Act in 1969, and Executive Order No. 11593 in 1971, the National Park Service began the process of implementing governmental law and policy regarding cultural resources within the parks.

By 1973, the National Park Service had established procedures for the inventory and evaluation of these cultural resources.

At roughly the same time the National Park Service was first coming to grips with the management of its cultural resources, two surveys of archaeological sites in the Mammoth Cave area were initiated. The first was known as the Hominy Hole Survey conducted by Vernon White, a folklorist-sociologist on the faculty at Western Kentucky University. The second was called the Green River Surface Survey and was conducted by Kenneth Carstens, a doctoral student of Patty Jo Watson's.

The Hominy Hole Survey

The Hominy Hole Survey was begun in 1970 and completed in 1977 (White 1980:1). Survey work within the Park was conducted under the auspices of Antiquities Act Permit No. 72-KY-014, which was issued on April 20, 1972 to Clifton D. Bryant, Chairman of the Department of Sociology and Anthropology at Western Kentucky University (WKU), to be used by Jack M. Schock (archaeologist at WKU) and Vernon White. The primary purpose of the survey was to investigate the archaeological distribution of grinding holes (sometimes referred to as "hominy holes") often found at the larger sandstone rockshelters located in the Western Coal Field area. White investigated a total of 223 sites (White 1980:3), seven of which are located within the boundaries of Mammoth Cave National Park. These seven sites were Nolin/Second Creek Rockshelter (MACA-18), Cubby Cove Rockshelter #1 (MACA-24), First Creek

Hollow Rockshelter #1 (MACA-44), No Name Rockshelter (MACA-54), Blue Heron Rockshelter (MACA-864), Green Heron Rockshelter (865), and McCoy Hollow Rockshelter (MACA-872). Simultaneous with White's work, Jack Schock conducted additional surveys in the Houchins Ferry locality, visiting 11 additional sites (MACA-72, MACA-77, MACA-84, MACA-197, MACA-216, MACA-872, MACA-874, MACA-875, MACA-876, MACA-877, and MACA-885). Neither White nor Schock conducted controlled excavations at the rockshelters, but they did collect artifacts from the surfaces of most of the sites. These materials were returned to the National Park Service in 1989.

Two of Schock's students, Frank Hoover and Mike Wells, also conducted a pedestrian survey along the Green River between Big Hollow and a point approximately 0.5 mi north of Dennison Ferry in April of 1974 under the aegis of Permit 72-KY-014 (Hoover and Wells 1974). Hoover and Wells did not locate any artifactual materials indicative of a prehistoric site, but they did identify the presence of 22 piles of stones on the northern rim of a mesa-like hill directly northeast of Dennison Ferry. Hoover and Wells suggested that these may be burial locations, but their placement around the perimeter of the hill suggests that these may instead be the result of historic field stone clearing activities. The "site" was given state site number 15 Ht 300 by WKU.

The Green River Surface Survey

In January 1974, Watson and Carstens initiated the Green River Surface Survey to locate and study the prehistoric sites of the Mammoth

Cave/Upper Green River area (Carstens 1980:22, Watson and Carstens 1975:2). During the course of their investigations, conducted intermittently over the next eight years and often responding to Park needs to assess impacts to archaeological sites, Watson and Carstens visited and recorded the locations of 67 sites within the Park boundaries (excluding Mammoth Cave) (Carstens 1974, 1980; Carstens and Jenings 1977; Watson and Carstens 1975, 1982). Forty-eight of these were rockshelters, two were caves, two were quarries, and fifteen were open sites (two bottomland, 13 upland) (Carstens 1974, 1980; Watson and Carstens 1975, 1982). Excavations and salvage operations were conducted at six rockshelters: Nolin/Second Creek Rockshelter (MACA-18), Blue Spring Hollow Rockshelter (MACA-37), Patch Rockshelter (MACA-43), Three Springs Pumphouse Rockshelter #1 (MACA-64), Martin Cave (MACA-83), Owl Cave (MACA-93), and one open site: Union City (MACA-56). Carstens also supervised the excavation of a test unit (Unit K) in the Vestibule of Salts Cave. Before the initiation of the Mammoth Cave National Park Archeological Inventory Project (MCNPAIP) in 1987, Carstens and Watson had visited and recorded 64% (67 of 105) of all the prehistoric sites then recorded within the Park, and had been the investigators of ten (83%) of those 12 sites investigated by controlled excavations. Carstens and Watson's work, motivated by scientific goals but also sensitive to management needs, provided the Park with an invaluable inventory of the archaeological resources in the Park. It also

provided the basis for Gail Wagner's (1978) master's thesis and Carstens' (1980) doctoral dissertation.

Wagner's (1978) study examined the patterns of prehistoric plant use at five rockshelter and cave sites in and around the Park. Wagner's analysis revealed that all of the sites "functioned primarily as specialized fall nut-gathering and hunting sites" (Wagner 1978:1), and that the same plant resources (hickory nuts, acorns, and walnuts) remained the primary plant foods from approximately 4000 B.C. through Mississippian times.

Carstens' (1980) dissertation summarized all that was known about Mammoth Cave area archaeology to that point. Applying Cleland's (1976) focal-diffuse subsistence model to the sites in Mammoth Cave National Park, Carstens identified what he perceived to be changes in prehistoric subsistence patterns through time. A major flaw in his approach, however, was that his analysis focused on evidence collected almost exclusively from rockshelters and caves and was limited to sites in the Park area. As will be shown below, by looking only at the assemblages of a limited range of sites (rockshelters and caves) and not at the full range of site types that prehistoric peoples used during their full seasonal rounds (rockshelters, upland open air sites, shell middens, etc.), his conclusions regarding shifts in economy (i.e., resource exploitation) through time lacked real explanatory value.

The JCCC Center Project Survey

A large number of sites would also be added to the cultural inventory of Mammoth Cave as the result of another project in the Park. This project was the relocation of the Jobs Corps Civilian Conservation (JCCC) Center at Childress Farm. The archaeological field work of the project was initiated on January 14-17, 1976, when Douglas Comer from the Historic Preservation Division of the National Park Service conducted a pedestrian walk over of four proposed alternative sites for the JCCC Center. These four areas were the Scotty Woodcock property located near Brownsville, the Pate Cook property (also located near Brownsville), the Lincoln School area located on the north central periphery of the Park, and the Nolin Reservoir area, located north of and several miles from the Park. No cultural material was found or collected by Comer. Because of poor ground visibility due to vegetative cover, however, Comer recommended that subsurface testing be performed at the site chosen for relocation of the JCCC Center prior to construction (Comer 1976a). The same recommendation was made when Comer surveyed a fifth possible relocation area for the Center in September, 1976 (Comer 1976b). This fifth alternative was also located in the Nolin Reservoir area.

From March 14 to March 24, 1979, a two-member team headed by Beditz (1979:ii) conducted archaeological surveys of four new proposed relocation sites for the JCCC Center. The four sites were designated the Cubby Cove, Fire Tower, Second Creek, and Childress Farm areas. The

original survey strategy called for shovel testing of the four tracts at 15 m intervals in areas likely to contain sites with shovel tests placed at 25 m intervals in areas of low site probability. Due to limited manpower and time limitations, however, Beditz was only able to excavate shovel tests at 25 m intervals for the western half of the Firetower tract, before switching to a method of "trowel testing" at 25 m intervals over the eastern half of the Firetower tract. The Cubby Cove and Second Creek tracts were, likewise, trowel tested at 25 m intervals and examinations were made of the bluffs along their northern boundaries for rockshelters. The Childress Farm tract was subjected simply to trowel testing at arbitrary intervals in exposed ground locations along parallel transects spaced 25 m apart. The northwest boundary of the Childress Farm tract was also investigated for rockshelters.

During the course of her 1979 investigations, Beditz located seven rockshelters and six upland chert finds that are currently listed as ten archaeological sites for the Park. Two of the rockshelter sites had been previously located by Carstens: First Creek Lake Rockshelter #1 (MACA-46) and First Creek Rockshelter #2 (MACA-47). The five other rockshelters were newly reported sites: Inaccessible Rockshelter (MACA-6), Cubby Cove Rockshelter #3 (MACA-17), Firetower Rockshelter (MACA-23), Cubby Cove Rockshelter #1 (MACA-24), and Cubby Cove Rockshelter #2 (MACA-25).

The six identified chert finds at Childress Farm were given separate "Field Site" numbers by Beditz but were not considered "sites" in her report

(Beditz 1979:12). Field Site 1 consisted of three flakes; Field Site 2 was a core, Field Site 3 was a core and biface fragment, Field Site 4 was three flakes, Field Site 5 was a biface fragment, and Field Site 6 was a single flake (Beditz 1979:10). Field Site 1 and Field Site 2 have subsequently been combined as the Childress Farm Ridge #1 site (MACA-234); Field Sites 5 and 6 have been assigned to Childress Farm Ridge #2 (MACA-235), and Field Sites 3 and 4 have been grouped together within Childress Farm Ridge #3 (MACA-236).

Subsequent to Beditz's 1979 survey, the Childress Farm tract was selected as the site for the relocation of the JCCC Center. Because Beditz's 1979 survey was unable to test for the presence or absence of significant cultural resources within the Childress Farm tract, a three-person team headed by Charles B. Poe conducted subsurface testing at the proposed relocation site from November 19 to December 7, 1979 (Poe 1980a). During the course of the investigations, ten test excavation units (1-by-1 m) and 595 posthole tests were excavated at MACA-236, although at that time it was not designated as a site. Historic materials were recovered in four of the hand tests. Prehistoric cultural materials were encountered in two of the units. Historic materials (but no prehistoric materials) were recovered from four of the posthole tests. A chert flake and white glass fragment were also surface collected from grid location 90N/90E (Poe 1980a:11).

The low numbers of prehistoric artifacts collected during testing at MACA-236 were interpreted to be the result of infrequent prehistoric

visitations to the area, and, for the most part, these prehistoric materials were disturbed by later historic agricultural activities (i.e., plowing). No subsurface features were identified during the testing procedures although a designation of Feature 1 was given to a historic standing structure classified as a "double pen" house and dated roughly to 1925-1935. Some historic debris was collected in the vicinity of this "feature." Based on the lack of subsurface features, low artifact density, and the historic plowing of the area, a ruling of no adverse impact on the cultural resources was proffered, and clearance given for construction of the JCCC Center on the Childress Farm property.

While Poe and his crew were conducting test excavations at Childress Farm Ridge #3, several rockshelters were investigated by the crew during their spare time (Poe 1979). These sites are now identified in the Cultural Sites Inventory as Childress Farm Rockshelter #1 (MACA-115), Childress Farm Rockshelter #2 (MACA-29), Childress Farm Rockshelter # 3 (MACA-32), Childress Farm Rockshelter #4 (MACA-13), and Childress Farm Rockshelter #5 (MACA-30). At the time of their discovery by Poe and his crew, four of the five sites appeared to be undisturbed. The remaining site (MACA-29) had apparently been dug into by a local group of Boy Scouts (Poe 1979:2), leaving a 15 to 30 cm depression roughly two m in diameter. Based on the proximity of these and presumably other rockshelters to the proposed JCCC Center, Poe recommended that an intensive survey of all the blufflines adjacent to the

Center be conducted and evaluated for possible mitigation from the vandalism expected with the occupation of the Center.

A year after Poe's investigations at Childress, Beditz was enlisted to survey the rockshelter areas around the Childress Farm tract. During her survey from November 14 to December 8, 1980, Beditz (1981) recorded the locations of 134 overhangs of which 28 are listed on the Cultural Sites Inventory as archaeological sites. Nine of these rockshelters had been previously reported by Carstens (1975), Poe (1979) and Beditz (1979). Of the 28 sites included in Beditz's 1981 report, 20 produced cultural materials and eight produced faunal materials which Beditz interpreted as being of cultural origin. Nineteen (67.9%) of the sites investigated by Beditz exhibited evidence of having been vandalized or looted.

The Trail System Walkover

Soon after Beditz concluded her initial survey work at the proposed JCCC Center development areas, it was decided to reroute portions of the Jaggers Ridge Cemetery-First Creek Lake-McCoy Hollow-Collie Ridge Horse and Foot Trail system because the originally planned trail route came too close to several rockshelters, most of which had been identified during Watson and Carstens' 1978 investigations. John W. Walker was given the task of evaluating the alternative routing of the proposed trail. During a one-day walkover on September 5, 1979, Walker visited nine sites (MACA-1, MACA-2, MACA-3, MACA-86, MACA-117, MACA-118, MACA-119, MACA-120, and

MACA-266) along the trail route (Walker 1980: Appendix C). Walker did not collect any artifacts from the sites he examined, but he did gather information regarding the historic sites he visited, especially the Clay Webb House site (MACA-266) (Walker 1980: Appendix B). Walker also recognized that despite attempts to reroute portions of the proposed trail away from sensitive areas, it would still run close by several known sites, and he recommended that all sites within 200 m of the trail be visited at least once a month to monitor for the vandalism that was likely to occur.

Cave Investigations

During the Survey Years, while most archaeological endeavors were focused on studying the surface sites, the archaeological resources of the caves did not go neglected. As a result of Carol Hill's interests in saltpetre mining in Mammoth and Dixon Caves and her notification of saltpetre mining-related materials in Dixon Cave, George R. Fischer was summoned to Dixon Cave on March 4th, 1974 to assess their integrity. Fischer noted the presence of a sharpened pole, a mixing paddle, and the probable remains of leaching vats. Excavations in Dixon Cave were suggested but were never conducted.

In 1980, George Crothers, a student of Patty Jo Watson's, investigated the archaeological remains at Sand Cave, site of Floyd Collins's death. Floyd Collins was trapped and died in the cave in 1925 while attempting to develop it for commercial exhibition (Murray and Brucker 1979). Crothers' study documented the prehistoric occupation of the rockshelter and the rescue efforts

to free Floyd Collins before he died (Crothers 1981, 1983). In 1983, John W. Hiscock, a student at Western Kentucky University, wrote a paper (Hiscock 1983) on the possible aboriginal origin of a wooden ladder in Mammoth Cave. His research was assisted by Valerie Haskins, another student of Patty Jo Watson's. In 1984, Tankersley began his extensive study of prehistoric mining activities in Mammoth, Salt, Lee, and Dixon Caves as part of a regional synthesis of prehistoric cave mining practices (Tankersley et al. 1985; Munson et al. 1989, Tankersley 1989). Tankersley and his colleagues have demonstrated that a suite of minerals were extracted prehistorically in Salts and Mammoth Caves, including gypsum crust, satinspar, selenite, epsomite, and mirabilite, using a variety of techniques, including scraping and bashing of mineral crusts and flowers from walls, digging and sifting of cave sediments, and ledge mining (Tankersley 1989; Tankersley *et al.* 1985, 1986; Munson *et al.* 1989). The extensive nature of this mining activity has led Tankersley (1989) to the same conclusion as Watson's, that these minerals were obtained for use in trade and that the aboriginal miners were very proficient in their mining techniques.

During this period, archaeological investigations of the caves and rockshelters continued to be pursued by members of the Cave Research Foundation, principally Phil DiBlasi. DiBlasi's investigations in the caves have included identifying and analyzing prehistoric cave drawings, which range from simple geometric patterns to zoomorphic depictions (DiBlasi 1987b, 1989).

DiBlasi continues to inventory the locations of rockshelters and caves in Mammoth Cave National Park.

Miscellaneous Small Survey Projects

Several smaller survey/clearance projects were also conducted in the Park in conjunction with development/construction projects and site protection training for the Mammoth Cave National Park staff. One of these was Carstens' (1978) clearance of the water and sewage utility lines from: (1) the Camp Grounds to the Maintenance/Residential area; (2) the Park Maintenance/ Residential area to the Mount McKinley Pumphouse; (3) Houchins Ferry to the western Park boundary; and, (4) Maple Spring Ranger Station to the north Park boundary. The project did not identify or recovery any artifacts.

A series of proposed land exchanges along the borders of the Park as a means of consolidating the Park's boundary precipitated another series of small areal surveys. These were performed under the direction of Charles B. Poe in early December, 1979. Poe's surveys were conducted in ten different localities and encompassed a total area of 122.9 ha (303.6 acres) (Poe 1980b). No archaeological sites were located during the pedestrian surveys of these areas, although two possible historic grave sites were discovered. One of the grave sites was located in a tract at the southern edge of the Park which has since been deeded away and is no longer Park property. The second grave site was found in a tract on the northern edge of the Park. This tract was to be acquired by the Park, but as yet no transfer of title has been recorded.

Another series of small clearance projects was conducted by Beditz in the fall of 1981. From September 15th to the 18th, Beditz conducted limited shovel testing for a proposed boat ramp at Dennison Ferry, at the proposed Maple Spring group camping area located on the former CCC Camp #4 site, at the trailhead area of the Maple Spring horse trail, at two alternate locations for the proposed trailhead parking area for the Jagger Ridge-First Creek Hollow trail system, and at a proposed trailhead parking lot south of Temple Hill Cemetery. All of her shovel tests were negative, and Beditz concluded that there would not be any direct impacts on archaeological resources as a result of the planned developments.

Another example of Park management activities which resulted in archaeological site visitations was the archaeological training session conducted at the Park on July 14-17, 1986, by George R. Fischer and Robert C. Wilson. During the training exercise, Fischer and Wilson visited MACA-6, MACA-10, MACA-11, MACA-27, MACA-28, MACA-29, MACA-30, MACA-62, MACA-64, MACA-68, MACA-94 and MACA-936 with members of the Park ranger staff. Recent vandalism and looting was recorded at most of the sites.

The MCNP Archeological Inventory Project

In June of 1987, the first of three planned field seasons under the auspices of the Mammoth Cave National Park Archeological Inventory Project (MCNPAIP) was initiated (Prentice 1988). I directed the entire project while employed as an archaeologist with the Southeast Archeological Center. The

second field season was begun in late February of 1988, and completed in early June of the same year (Prentice 1989b). The third field season began November, 1988 and ended March 31, 1989 (Prentice 1990a). The summary report (Prentice 1993) was completed in 1991 and published in 1993. The results of these field investigations and analyses are summarized in the following two chapters and presented in detail on a site by site basis in Prentice (1993).

During and following completion of the MCNPAIP fieldwork, there have been a number of minor archaeological clearance projects prompted by the development of facilities and trails for visitors to the Park. These included archaeological investigations by DiBlasi (1987a) associated with the placement of a new water line at the Austin House (MACA-94) site in 1987, the excavation and shovel testing of the Old Guides Cemetery site (MACA-62) by Prentice in September of 1988 (Prentice 1989b), shovel testing of the drainage field north of Maple Spring Ranger Station by Prentice in August of 1988, shovel testing of the Onyx Meadows Environmental Station by Prentice in September of 1988, additional testing of Old Guides Cemetery in November of 1989 by Bryne (Bryne and Card 1990), shovel testing of the surface site (MACA-995) around Longs Cave (MACA-241) and shovel testing and excavation along the Heritage Trail by Bryne in November, 1989 (Bryne and Card 1990), and shovel testing in various Park locations by Horvath in 1990.

Austin House Site

In early October of 1987, a new domestic water line was routed across a portion of the Austin House site (MACA-94) as part of an upgrading of facilities at the Floyd Collins Home Complex which is currently used by the Cave Research Foundation (CRF). Philip J. DiBlasi, CRF member and University of Louisville archaeologist, monitored the excavation of the pipeline and made controlled surface collections from the site. Based on the artifacts and historical research, DiBlasi (1987a) concluded that a building once stood to the southwest of the current Floyd Collins Home. This late 19th century building, torn down sometime after 1935, was the original Collins home on the site. The currently standing Floyd Collins Home was built in the early 1930's, several years after Floyd Collins' death. Artifacts associated with the original Collins structure indicated that a cottage industry involving the manufacture of souvenirs from freshwater mussel shells was pursued by the Collins family during their ownership and exhibition of Crystal Cave.

Old Guides Cemetery and Heritage Trail

Old Guides Cemetery (15 Ed 85) was first identified as an archaeological site by Watson and Carstens in 1982 (Watson and Carstens 1982:65). The Old Guides Cemetery site was reinvestigated in the fall of 1988 when the Park constructed a paved trail for the benefit of the physically handicapped. At the time of the 1988 investigations, the paved trail was referred to as the All Peoples Trail; but, it was later renamed the Heritage Trail. The 1988

investigations at the site were conducted from September 8 to 16, during which time five two-by-two m units and five one-by-one m units were excavated to sterile subsoil. An additional six shovel tests were also excavated to help determine the eastern limits of the site. Based on the results of these investigations, the known limits of the site were extended from Sunset Point to the parking lot of the present Mammoth Cave New Hotel. Diagnostic artifacts (projectile points) datable to the Middle Archaic, Late Archaic, Early Woodland, and Late Woodland periods were recovered from the site during the excavations, but no subsurface features were encountered. Excavations did reveal, however, that in the vicinity of the historic cemetery, the site has never been plowed.

In the fall of 1989, plans for construction of a fence around the historic cemetery at Old Guides Cemetery necessitated additional clearance work at the site. During a period from November 3rd to the 6th, a SEAC crew under the direction of Stephen Bryne excavated 40 shovel tests at 8 ft intervals around the perimeter of the cemetery (Bryne and Card 1990). Numerous chert artifacts, including a Big Sandy end scraper, were recovered during the shovel testing, but no subsurface features were found by the crew.

Simultaneous with the 1989 shovel testing of Old Guides Cemetery, Bryne directed the excavation of 43 shovel tests spaced at 10 m intervals and two one-by-one m test excavation units along the route of the Heritage Trail from the Mammoth Cave New Hotel to the staging area of the paved,

handicapped-accessible Heritage Trail circumscribing Old Guides Cemetery. The testing was prompted by the planned construction of a paved, handicapped-accessible trail from the Hotel to the previously paved portion of the Heritage Trail. During these investigations, Bryne and his colleagues encountered numerous historic artifacts that were probably associated with two residential sites (MACA-601 and MACA-602) located just northwest of the Mammoth Cave Old Hotel complex. Prehistoric artifacts were also recovered in abundance from the test units.

Maple Spring Ranger Station and Onyx Meadows Environmental Station

On August 9, 1988, Bruce Manzano and Guy Prentice excavated seven shovel tests north of the Maple Spring Rangers Station residential building. The testing was precipitated by the installation of a new septic system on the site. The shovel tests produced historic artifacts associated with the occupation of the ranger station, but no other artifacts or subsurface features.

On September 8, 1988, a SEAC crew under my direction excavated four shovel tests at the Onyx Meadows Environmental Station prior to the installation of a new facility to house the environmental monitoring equipment. The shovel tests revealed the presence of a 30 cm plowzone but no artifactual materials were recovered.

Longs Cave

By the time the MCNPAIP field work had been completed, subsurface archaeological investigations at the entrance to Longs Cave have been planned for several years, but they have been prevented by the presence of unstable rock formations located above the cave entrance. The investigations were planned because of the need to remodel the entrance of the cave to return it to a more natural condition for the Indiana bats (*Myotis sodalis*) that inhabit and hibernate in the cave. Because the unstable rocks above the cave entrance make test excavations unsafe, such investigation were to be delayed until the area has been stabilized. In the mean time, Bryne and his crew visited the site in November of 1989 and excavated eight shovel tests on the ground surface in front of the sink in which the cave entrance is located. Three of the shovel tests produced lithic debris that was assigned to the site, Longs Cave Surface (MACA-995). None of the artifacts was temporally diagnostic, and no subsurface features were identified.

Horvath's Investigations

From March 7th to March 13th of 1990, SEAC Archeologist Beth Horvath directed a series of small shovel test clearances at various locations in the Park (Horvath 1990). The first was the Fire Circle along Campground Loop A. The area had already been disturbed by grading activities, so clearance for the project was given after a visual inspection and the excavation of two shovel tests.

Following the inspection of the Campground Loop A Fire Circle, Horvath conducted the excavation of three shovel tests at the proposed Big Woods Parking Area. The area had been previously disturbed by the placement of old roads, and the shovel testing failed to produce anything except modern litter.

Three shovel tests were excavated by Horvath and her crew in the location of the Green River Overlook on March 7th, 1990. No artifactual materials were recovered.

On March 8th, 1990, Horvath excavated two shovel tests in the location of the Sand Cave Pull-off. The disturbed condition of the site was evidenced by the recent fill dirt unearthed in the tests. A small piece of a bottle was recovered in one of the tests.

On March 9, 1990, Horvath directed the excavation of nine shovel tests in the proposed parking area and along the trail of the Woolsey Valley Overlook. All of the tests were sterile. During the investigation, Horvath inspected a nearby historic site (MACA-756) which was evidenced by a root cellar and open well. The well was capped with limestone slab with a hole in the middle. Ceramics, glass, and leather were collected from the site surface.

The planned construction of a handicapped-accessible picnic area on the north side of Beaver Pond necessitated Horvath's excavation of a series of shovel tests along the north side of the pond. Five shovel tests were excavated directly beside the pond, and artifactual materials were recovered from four of the five tests. These materials included numerous chert flakes, a chert

scraper, and projectile point fragment. During this first stage of investigation near the pond, Horvath observed that the nearby historic site, MACA-772, had the remains of a root cellar and an iron well casing.

From March 9 to March 12, 1990, Horvath directed the excavation of 49 shovel tests along various portions of the proposed path for a Bike/Hike Trail to run from just east of the Violet City and Carmichael Entrances to the eastern Park boundary near the former town of Chaumont. The proposed Bike/Hike Trail primarily runs on or immediately parallel to the old road that ran from Sloans Crossing to Mammoth Cave and the old Mammoth Cave Railroad grade. Horvath placed her shovel tests along those sections of the proposed trail where the proposed path deviated from the existing road and railroad grades.

The first of Horvath's shovel tests were located near the Violet City and Carmichael Entrances where she encountered chert flakes and cobbles in an area where chert cobbles were observed eroding out of the limestone outcrops. The materials collected from the site (MACA-999) suggest that this may have been a prehistoric chert extraction site.

The only other prehistoric materials collected by Horvath during her investigations of the Bike/Hike Trail came from the area where the trail crosses the northern end of the Beaver Pond site (MACA-996). In this area, Horvath collected numerous pieces of chert debris but no diagnostic artifacts.

Summary and Discussion

As we have seen, due to Park management objectives, most of the archaeological studies sponsored by the Park Service prior to 1987 (Beditz 1979, 1981; Carstens 1978; Poe 1979, 1980a, 1980b; Watson and Carstens 1982) focused on surveying the areas of the Park containing the highly visible and vulnerable rockshelters and caves. The Park Service later came to recognize that their focus on the rockshelters and caves had given archaeologists an invaluable glimpse into certain aspects of prehistoric life, but had left the archaeological community with a large information gap in respect to the open-air sites that were known to exist in the area.

To rectify this bias, the National Park Service initiated the Mammoth Cave National Park Archeological Inventory Project in order to develop a more complete inventory of the types and the conditions of the prehistoric cultural resources in the Park and to gain a better understanding of the factors that have affected the selection, use, and abandonment of these sites. Presenting the results of these investigations is the goal of the next two chapters.

THE MAMMOTH CAVE NATIONAL PARK ARCHEOLOGICAL INVENTORY PROJECT

Research Objectives

The research objectives developed for the Mammoth Cave National Park Archeological Inventory Project were meant to address a number of the administrative needs of the Park as well as the scientific interests of the archaeological community. The most important of these administrative needs consisted of the following: (1) to prepare a site prediction model so that future Park development could avoid impacting high site probability areas; (2) to evaluate site destruction due to vandalism, natural, and other causes as a means of providing a basis for the management and protection of these cultural resources; (3) to evaluate sites for possible nomination to the National Register of Historic Places; (4) to update the National Park Service's computerized Cultural Sites Inventory database, (5) to resolve location errors for several previously reported sites located within the Park; and (6) to provide site information to the Cave Research Foundation and Kentucky State Historic Preservation Office to supplement their ongoing research. In conjunction with these administrative objectives were the research interests of the principal investigator. These interests focused on the development of a site settlement

model focusing on the ecological and economic factors determining site location with chronology, cultural affiliation, site type, and seasonality being the most significant variables considered within the model. As with any scientific program, the field methods and subsequent analyses were tailored to the research questions, the nature of the data, and the physical and monetary constraints of the research budget.

Research Design and Field Methods

The large size of the project area (21,214 ha or 52,420 acres) precluded a total survey of the Park due to budgetary limitations; therefore, a sampling strategy was required for locating sites that would provide a sound and scientific basis for predicting the locations of sites outside those areas receiving direct study. The sampling strategy chosen was a stratified one and encompassed different survey methods depending on the areas surveyed.

First, the Park was divided into three survey zones (based on the topographic characterizations of the Park): uplands, blufflines, and riverine floodplains. These three areas were chosen as appropriate divisions for stratifying the Park for sampling purposes because they are distinctly different in their general topological features and because the major vegetative communities within the Park generally correspond with these topographic zones. Present ideas also hold that the correlation of vegetative communities with these topographic zones has been a relatively stable one for the last 6000

to 7000 years (Watson and Carstens 1982; Prentice 1993). It is presumed for the present archaeological study, therefore, that the topographic and vegetative regimes have been stable factors influencing site location both prehistorically and historically by determining where habitable and arable lands, water source locations, vegetative resources, faunal resources, and mineral resources were available to the prehistoric local inhabitants. Within each of the three topographic zones, random areas were chosen for survey.

Upland and Bottomland Shovel Test Survey

Dense vegetative growth in the uplands and floodplain areas of the Park necessitated a method of locating sites which would not adversely impact the natural resources in the Park, but would allow the discovery of sites within these topographic zones. To accomplish this the uplands and floodplains were surveyed using shovel testing methods following transect lines spaced 25 m apart with shovel tests placed at 25 m intervals. If large trees or other natural obstructions prevented shovel testing at a particular 25 m interval, the unit was offset to avoid the obstruction, and the shift in the test location was duly noted.

The shovel tests were dug approximately 50 cm in circumference and 40 cm deep except where subsurface conditions (e.g., bedrock) prevented it. The 40 cm depth of the shovel tests allowed the examination of the subsoil for any features or middens that may have existed below the typical 30 cm plowzone found in these areas of the Park. In the case of bottomland testing, small

diameter tube sampler cores were used at the base of the 40 cm holes to probe deeper for buried archaeological deposits that may have been covered by alluvium and colluvium. The use of tube sampler cores was not practiced in the upland shovel testing procedures since buried archaeological deposits were unlikely in the uplands where erosion and soil deflation has been the prevailing rule for the last several thousand years.

The upland and bottomland areas chosen for shovel testing were typically 200-by-200 m (four ha) units referred to as "blocks" in the study. Some of the units falling on the edges of topographic zones were altered to conform to topographic boundaries. Each block in the Park was given a numerical referent with floodplain units distinguished from upland units by the use of a "B" suffix (for "bottomland"). Upland blocks did not get a letter suffix. Within each of the survey blocks, transects were given consecutive numbers, as were each of the shovel test units in each transect. For example, the notation 722-3-4 within the shovel testing system refers to upland Block 722, transect line 3, shovel test 4; 106B-1-3 refers to bottomland Block 106B, transect line 1, shovel test 3.

The soil removed from the shovel tests was screened through 1/4 in mesh and all artifacts recovered were bagged and recorded according to UTM location, except for limestone and sandstone rough rock which was not kept. When archaeological materials were encountered, the site data necessary for completing the State of Kentucky site forms and the National Park Service's

Cultural Sites Inventory (CSI) were gathered. This included but was not limited to: distance to nearest available water source, areal extent and depth of site, the presence of looting and vandalism, local topography, local vegetation types, and soil types. Archaeological and architectural remains observed on the open ground surface were also recorded and, where appropriate, surface materials were collected for analysis. A benchmark or datum with a numbered tag was then placed at the site as a means of site identification.

Bluffline Pedestrian Survey

A different survey method was employed when the bluffline areas within the Park were examined for rockshelter and cave sites. Rather than following arbitrary linear transects, the bluffline areas were surveyed following the natural terrain of the bluffs. By spreading out, up and down the bluffline face, and following the natural curves of the bluffline, a crew of four could efficiently examine the entire bluff from top to bottom. The bluffline was thus surveyed as a linear feature rather than as an areal one. Again, the sections of bluffline sampled were chosen on a random basis. This was accomplished by dividing the bluffline areas of the Park into 197 bluffline units, and randomly choosing 30 of the units for survey.

When natural overhangs and caves were located during the bluffline survey, they were photographed and data were recorded on size, floor conditions, topographic location, direction of exposure, etc. When evidence of

prehistoric human occupation was noted, the overhang or cave was treated as an archaeological site. This included mapping the limits of the site, mapping the locations of surficial features and the locations of collected artifacts, and recording the presence or absence of looting and vandalism. Metal tags were affixed to metal pipe datums at each site for future site identification.

Test Excavation

After the shovel test and bluffline survey phases of the Project had resulted in the identification of a variety of distinguishable site types within the Park, a representative sample of these were selected for test excavation. All test excavation units were dug using hand tools (shovels, trowels, etc.) and standard archaeological techniques were employed in data recovery, including: mapping and photographing of profiles and features, screening of excavated soils, collecting floatation samples for floral and faunal analysis, collecting radiocarbon samples for dating purposes, and so forth. Soils removed during excavation were sifted through 1/4 in mesh, and all recovered materials from each level were kept for analysis. After the stratigraphy in a unit was recorded cartographically and photographically, column samples were taken along a representative portion of one of the unit profiles. The column samples were 30 by 30 cm in horizontal dimension and were separated vertically following the natural soil stratigraphy. The column samples were later processed using water flotation methods to permit floral and faunal analysis. When radiocarbon samples were collected during excavation, only single pieces

of carbonized plant materials were submitted for radiocarbon analysis. Usually more than one radiocarbon sample was submitted from a particular unit in order to better evaluate the possibility of spurious dates.

Test excavations conducted at the rockshelters typically consisted of one-by-one m units. Excavation units at rockshelter sites were placed both inside and outside the driplines. Rockshelter test units were dug in arbitrary ten cm levels when observable natural stratigraphy was lacking, and in ten cm levels within natural stratigraphic zones when soil changes were observable. All units were dug to bedrock or sterile subsoil, except where circumstances (e.g., extremely wet soil conditions, large pieces of rockfall, etc.) did not permit it.

Test excavations at open air sites typically consisted of two-by-two m units, although one-by-two and one-by-one m units were also excavated at some of the open air sites. Open air test units were generally dug in natural levels, the first level usually consisting of plowzone. Below this zone sterile subsoil was usually encountered, and excavation was normally terminated at this point. In the case of the Dry Creek site (MACA-137), however, the presence of an undisturbed midden beneath the plowzone and a fire pit/hearth beneath the midden, allowed for the excavation of these unique features.

Backhoe excavations were conducted at two floodplain sites (one prehistoric, one historic) in order to examine the geomorphological settings at these two sites and to test for deeply buried archaeological deposits. During these investigations archaeological materials were collected from the profile

walls, but the backhoe excavated soils were not examined for artifacts. No evidence for deeply buried archaeological deposits were found at either location.

Methods of Analysis

Analysis of the artifactual material gathered during the project followed standardized archaeological methods for assigning artifacts to formal categories (projectile points, drills, pottery, etc.) and served as the primary basis for assigning chronological placement to sites. Recovered archaeological materials were assigned to artifact classifications based on form and composition; length, width, length, and weight measurements were taken as were primary colors, evidence of heat alteration, and, in the case of chert artifacts, the presence or absence of cortex. Counts were made of all artifacts except for most of the floral materials which were only weighed.

More detailed analysis was performed on projectile points and pottery fragments, since these were the primary basis for assigning chronological placement to sites. Projectile points were assigned to a type or cluster following the conventions used by Justice (1987) for classifying projectile point styles in the eastern United States. Metric and attribute analysis was performed on each point. Pottery fragments were also assigned to types based primarily on temper and exterior vessel surface treatment. Most of the pottery types have been previously defined by previous researchers, while others are

newly defined on the basis of data gathered during the course of the project. Metric and attribute analyses were also performed for each pottery sherd.

The information gathered during all levels of artifact analysis was encoded in a computerized inventory system written with dBASE III+ called START (Prentice 1989c), that relates the artifactual data with archaeological provenience, soil types, vegetation zones, etc. so that relationships between artifactual distribution and physiographic environment may be examined for patterning.

The identification of the types of materials used in artifact production (cherts, clays, etc.) and their possible sources provides the basis for evaluating exchange patterns and other economic behavior. Identification of fauna and flora collected at the sites has provided information regarding dietary habits, resource procurement, seasonality, and, in conjunction with the artifactual material, the types of activities pursued by the original inhabitants at each site. Floral and faunal analysis also provides limited data for evaluating past environmental change in the Mammoth Cave area.

An integral part of the Mammoth Cave survey project included the development and use of computerized mapping to increase the efficiency of data capture, spatial analysis, and publication illustration. This was performed using a commercially available CADD (Computer Assisted Drawing and Design) software package and a polar coordinate mapping program called TRANSIT written by the principal investigator using dBASE III+. The

development of the TRANSIT program allowed the mapping of site limits and artifact distributions by simply recording angles and distances from a single datum point. This quick field data recovery technique, for example, allowed the author to map the spatial information for a typical rockshelter site in about one hour, thus permitting a much faster method of accurately recording site data than is typical of the usual Cartesian or grid based mapping systems. After the polar coordinate information was gathered in the field it was then entered into the TRANSIT program which converted the polar coordinate data into the more familiar Cartesian coordinate sets. This information was then transferred to the CADD program where it was used to draw the site maps used in subsequent reports (Prentice 1988, 1989a, 1989b, 1990a).

Once entered into the CADD package, habitation area sizes, rockshelter orientations, distance between artifacts, etc. could be easily determined using the built in mathematical functions of the CADD program. These provided the basic information used to evaluate factors that may have affected prehistoric site selection such as occupiable area, solar exposure, prevailing winds, and so forth.

The mapping data that had been accumulated at this point were then entered into the computerized Geographic Information System (GIS) operated at the Southeast Archeological Center, Tallahassee, Florida. The Center is using the GRASS software package which has been adopted as the standard for National Park Service GIS analysis. The GRASS software package is able

to integrate both raster and vector data sets and has a built in statistical package which allows for the evaluation of spatial relationships between multiple thematic layers using raster data. The thematic layers that have been entered into the GIS system for the Mammoth Cave National Park Archeological Inventory Project include vegetation zones derived from Landsat imagery, prehistoric and historic site locations (divided according to site type, site size, period of occupation, and degree of looting/vandalism), surficial hydrology, existing roads and trails, USGS Digital Elevation Module data sets (elevation, slope, aspect), surficial geology, bluffline survey units, shovel test units, 1933 site locations and property lines, 1922 house site locations, 1930s land use maps, 1960s vegetation maps, major topographic zones, and political boundaries.

The vegetation zones derived from Landsat imagery were developed using an unsupervised multispectral classification program known as ERDOS. The various classifications identified by the computer were based on nonparametric classification of Bands 4, 5, and 7, which in turn were categorized using ground-truthing methods. The Landsat imagery utilized in this exercise was collected during early April, and was chosen because the areas of the Park covered by deciduous forest are just beginning to develop their leaf cover at this time of the year. This early leaf condition allowed for the classification of significant canopy forest zones based on their respective spectral reflectance signatures, and also allowed for the detection of subcanopy

phenomena (rock outcrops, sinkholes, etc.) that would not have been possible during summer or winter months when forest vegetation are in full leaf conditions.

Use of the GRASS system has made it possible to analyze efficiently the spatial relationships exhibited between prehistoric sites and the various topographic, environmental, and potential resource zones necessary in order to perform multiple site catchment analyses. It has also permitted the National Park Service with the means to test the correlation between levels of site looting and site proximity to roads and trails in a manner that is efficient, quantifiable, and reproducible. The results of these analysis are presented in greater detail below.

RESULTS OF THE INVESTIGATIONS

Summary of the History of Investigations

During the 1987 field season, the crew of the Mammoth Cave National Park Archeological Inventory Project identified 30 new sites (including isolated artifacts) and visited four sites previously identified by the fieldwork of Nelson, Schwartz, and Carstens (Prentice 1988). All the sites except one, Sunday Hike Rockshelter (MACA-90), were open-air sites located in the uplands and bottomlands. Test excavations were conducted at two of the upland sites, Holton Ridge (MACA-121), and Dennison Ridge (MACA-133). Four units encompassing 16 m^2 were excavated at MACA-121 and three units encompassing 6 m^2 were excavated at MACA-133. No subsurface features were found at either of these historically plowed sites.

In the spring of 1988, the MCNPAIP crew returned to Mammoth Cave for field season II. During the second field season, the MCNPAIP recorded 59 new sites and visited 31 previously known sites (Table 1). The majority of these sites were rockshelters and were investigated during the bluffline survey portion of the project. Some shovel tests were conducted, however, at a number of upland and floodplain sites to determine site boundary limits and

as part of the random shovel testing procedure initiated in field season I. Two test excavations encompassing 8 m^2 were conducted at one upland site, Turnhole Ridge #2 (MACA-135). No subsurface features were found at the site.

In the fall of 1988, the third Mammoth Cave National Park Archeological Inventory Project field season was initiated, and it culminated in the spring of 1989. During season III, the major emphasis was spent conducting test excavations at ten prehistoric sites in the Park. A total of 45.1 m^2 were excavated at these ten sites (MACA-44 [2.5 m^2], MACA-65 [2.0 m^2], MACA-122 [8.0 m^2], MACA-131 [12.0 m^2], MACA-137 [9.6 m^2], MACA-164 [2.0 m^2], MACA-166 [1.0 m^2], MACA-171 [2.0 m^2], MACA-172 [3.0 m^2], and MACA-872 [3.0 m^2]) and thousands of artifacts were collected for analysis.

Another major portion of the third MCNPAIP field season was spent conducting shovel test surveys in the northeastern and southwestern portions of the Park. On the basis of the artifactual materials recovered in 13 of the 274 shovel tests excavated during the third season, a total of four sites (MACA-248, MACA-731, MACA-886 and MACA-887) and an isolated artifact (MACA-936) were identified. A small portion of the third field season was also spent conducting pedestrian surveys in three bluffline areas, the result being the recording of six new rockshelter sites (MACA-866, MACA-867, MACA-868, MACA-869, MACA-870, MACA-871) and one historic residential site (MACA-739).

During the third field season, some time was also spent trying to resolve site location problems for several previously recorded sites. While trying to relocate these previously reported sites, 29 sites were investigated (Prentice 1990a).

During the entire three seasons of the MCNPAIP, a total of 1594 shovel tests were excavated at 25 m intervals in 28 randomly selected shovel test blocks encompassing a total area of 78.04 ha in the uplands (ridges and valleys) and 30.30 ha in the bottomlands. A total of 28 sites and six isolated finds were identified within the 28 shovel test blocks. The MCNPAIP pedestrian surveys of randomly selected units along the blufflines encompassed a total of 1359 ha, or 16% of the total 8665 ha of bluffline area in the Park, and resulted in the recording of 418 overhang locations within the survey areas. Forty four of these overhangs produced prehistoric cultural materials and were classified as prehistoric rockshelter sites. Two overhangs were classified as historic rockshelter sites. Seven rockshelters had both prehistoric and historic components (Table 2).

Combined with the previous survey work of Watson and Carstens (3522.34 ha.), and Beditz and Poe (1168.74 ha.), 4951.79 ha of the Park have been surveyed by pedestrian survey and shovel/posthole testing. Although 4951.79 ha of survey area represents a significant portion (24%) of the 20,567.25 ha of land in the Park, large portions of the Park (76%) remain unexamined, especially the Dry Prong drainage area and that portion of the

Park located within Hart county north of the Green River. It should also be noted that, during the MCNPAIP, 24 new sites (20 rockshelters, one chert quarry, and three open-air sites) were discovered in areas of the Park which had been previously surveyed, and it is likely that additional sites exist within previously surveyed areas that have not been identified.

Current Level of Site Information

Prior to the initiation of the Mammoth Cave National Park Archeological Inventory Project in 1987, there was a total of 120 archaeological "sites" listed in the Cultural Sites Inventory for Mammoth Cave National Park, 11 of which were interior locations inside Mammoth Cave (MACA-215). Following completion of the Project, the number of known prehistoric sites in the Park was increased to 223 with Mammoth Cave and its interior components counted as one site. Many of the prehistoric sites in the Park are multi-component with a total of 349 known separate cultural components distributed among the 223 sites.

Based solely on the presence of surface and/or excavated temporally diagnostic artifacts, the 349 site components can be categorized as follows: two Paleoindian sites, 89 Archaic sites, 107 Woodland sites, and 22 Mississippian sites. Thirteen sites have components that can only be narrowed to either the Late Woodland or Mississippian periods. One hundred sixteen (52%) of the prehistoric sites cannot be assigned to a more specific time period than

"prehistoric." The number of sites representing each of the major time periods are broken down into Early, Middle, and Late categories in Table 4.

Only 27 (12%) of the 223 known prehistoric sites in the Park have been excavated in any scientifically useful manner. These sites are Nolin/Second Creek Rockshelter (MACA-18), Blue Spring Hollow Rockshelter (MACA-37), Patch Rockshelter (MACA-43), First Creek Hollow Rockshelter #1 (MACA-44), Union City (MACA-56), Old Guides Cemetery (MACA-62), Three Springs Pumphouse Rockshelter #1 (MACA-64), Jagger Ridge Rockshelter (MACA-65), Salts Sink Surface (MACA-73), Nelson's Rockshelter (MACA-82), Martin Cave (MACA-83), Salts Cave Interior (MACA-89), Sell's Farm/Salts Cave Fields (MACA-92), Owl Cave (MACA-93), Holton Ridge (MACA-121), Blowing Spring Ridge #1 (MACA-122), Hollow Creek (MACA-131), Dennison Ridge (MACA-133), Turnhole Ridge #2 (MACA-135), Dry Creek (MACA-137), Blowing Spring Rockshelter #1 (MACA-164), Blowing Spring Rockshelter #2 (MACA-166), Kingbird Rockshelter (MACA-171), Blowing Spring Rockshelter #3 (MACA-172), Mammoth Cave (MACA-215), Childress Farm Ridge #3 (MACA-236), and McCoy Hollow Rockshelter (MACA-872).

Of these 27 sites, only ten (Table 5) have produced cultural deposits (middens, features, etc.) from demonstratively "unmixed" contexts: Blue Spring Hollow Rockshelter (MACA-37), Patch Rockshelter (MACA-43), Jagger Ridge Rockshelter (MACA-65), Nelson's Rockshelter (MACA-82), Martin Cave (MACA-83), Salts Cave Interior (MACA-89), Owl Cave (MACA-93), Dry Creek

Table 4. Numbers of Site Components in Mammoth Cave National Park Listed by Major Time Periods.

Early Paleoindian	1
Late Paleoindian	1
Total Paleoindian	2
Early Archaic	12
Middle Archaic	23
Late Archaic	53
Archaic Unspecified	1
Total Archaic	89
Early Woodland	43
Middle Woodland	31
Late Woodland	27
Woodland Unspecified	6
Total Woodland	107
Late Woodland or Mississippian	13
Mississippian	22
Total Late Woodland/Mississippian	35
Prehistoric Unspecified	116
Total Prehistoric	349

Table 5. Test Excavated Sites Within Mammoth Cave N.P.

SITE #	EXCAVATED AREA (m^2)	UNMIXED DEPOSITS	ARCHAIC	WOOD-LAND	MISSIS-SIPPIAN
MACA-18	0.1				
MACA-37	22.5	X		X	X
MACA-43	4.0	X	X	X	
MACA-44	2.5				
MACA-56	0.5				
MACA-62	25.0				
MACA-64	3.0				
MACA-65	2.0	X	X	X	X
MACA-73	15.0				
MACA-82	3.3	X		X	
MACA-83	2.0	X	X	X	
MACA-89	39.0	X		X	
MACA-92	7.0				
MACA-93*	4.0	X	X	X	
MACA-121	16.0				
MACA-122	8.0				
MACA-131	12.0				
MACA-133	6.0				
MACA-135	8.0				
MACA-137	9.6	X			X
MACA-164	2.0				
MACA-166	1.0				
MACA-171	3.0	X		X	
MACA-172	2.0				
MACA-215	96.8				
MACA-236	10.0				
MACA-872	3.0	X	X		
TOTAL	307.3	12	5	8	3

Two units initiated by Carstens outside Owl Cave but abandoned before completion have been omitted from the present calculations.

(MACA-137), Kingbird Rockshelter (MACA-171), and McCoy Hollow Rockshelter (MACA-872).

The ten sites producing unmixed deposits contained Archaic components (MACA-43, MACA-65, MACA-83, MACA-89, MACA-93, MACA-872), Woodland components (MACA-37, MACA-43, MACA-65, MACA-82, MACA-83, MACA-89, MACA-93, MACA-171), and Mississippian components (MACA-37, MACA-65, MACA-89, MACA-137). All but one of the sites, MACA-137, are rockshelter/caves, and the sum total of these excavations represent only 92.4 m^2 in area. If Nelson's Rockshelter (MACA-82) is excluded from the tally because of the limited usefulness of the data gathered during Nelson's afternoon of work in 1916, Unit D at Salts Cave Interior (MACA-89) is omitted because it lies in the path of surface water runoff (and probably represents redeposited soils from upslope), and one of the test units at Martin Cave (MACA-83) is disregarded because it was excavated within disturbed ground, then the total area of excavation in the Park producing unmixed deposits is reduced to 84.1 m^2. Of these 84.1 m^2, 61.5 m^2 (73%) were excavated at only two sites -- Blue Spring Hollow Rockshelter (22.5 m^2) and Salts Cave Interior (39 m^2). The other seven sites represent only 27% of this total 84.1 m^2. These figures illustrate the limited extent to which good excavated archaeological data from undisturbed contexts have been gathered from rockshelter/cave sites other than Salts Cave and Blue Spring Hollow Rockshelter, and the virtual lack of such data from undisturbed open-air sites.

Despite the lack of extensive data from controlled excavations, there is a great deal of site information gathered from the various sites that can be applied to the settlement pattern analyses addressed in this study. The only problems in using this information is the lack of temporal controls and the associations between artifacts due to their disturbed contexts. These problems will be addressed after closer examination of the Park site data that currently exists for each of the time periods.

Summary of the Prehistoric Culture History of the Mammoth Cave Area

Introduction

Based on the presently available archaeological evidence, humans first arrived on the Kentucky landscape sometime around 9500 B.C. These people were the ancestors of the Indian groups that were later found populating North America when the first European explorers arrived along the Atlantic coast during the second millennium A.D. Among the archaeological community, the convention has been adopted of referring to those times before European peoples arrived and described what they found in the New World as "prehistoric" (i.e., before written history) and the times following European arrival but prior to the first documented European exploration and settlement as "proto-historic." That convention is followed here.

The prehistory of Kentucky can be divided into four major periods that occur in the following chronological order: Paleoindian, Archaic, Woodland, and

Mississippian. Each of these major periods has been divided into smaller periods which usually reflect changes in artifact styles and the adoption of new artifact types, but often reflect changes in economic and social organization as well.

The Paleoindian Period (9500-8000 B.C.)

The earliest inhabitants of the Mammoth Cave area of which we have archaeological evidence are the Paleoindian groups usually associated with a highly mobile hunting economy with a blade-based lithic technology exhibiting lanceolate projectile point forms as the most diagnostic tool type. The Paleoindian period is typically dated from ca. 9500-8000 B.C., although there are no Paleoindian sites in Kentucky that have direct carbon isotope or other chronometric dates associated with cultural deposits (Tankersley 1988).

The Paleoindian period can be divided into two subunits: Early Paleoindian (ca. 9,500-8500 B.C.) and Late Paleoindian (ca. 8500-8000 B.C.) (Tankersley 1988). The fluted, lanceolate projectile point is the most diagnostic artifact of Early Paleoindian groups. Clovis and Cumberland projectile point types and their stylistic cousins (Ross County, Redstone, Debert, and Holcombe) are assignable to the Early Paleoindian period (Tankersley 1988; Justice 1987).

Unfluted, lanceolate projectile points are characteristic of the Late Paleoindian period and include Plainview, Agate Basin, Beaver Lake, Quad, Greenbrier, Hardaway Side Notched, and Dalton types (Tankersley 1988;

Justice 1987). These Late Paleoindian points are significantly smaller than the lanceolate points of the Early Paleoindian period, and may represent a shift from a thrusting spear to a throwing one to accommodate a greater emphasis on smaller game hunting (i.e., deer) in a forest environment.

The evidence for a Paleoindian presence in the Mammoth Cave National Park area consists of only seven isolated projectile points. Most of these points appear to be points that were picked up by later prehistoric groups, recycled, and redeposited at rockshelters. There are no proven habitations sites in the Park that date to the Paleoindian period, although it is possible that there was once an Early Paleoindian occupation of Indian Hill - Top (MACA-78) and a Late Paleoindian occupation at Jagger Ridge Rockshelter (MACA-65). Isolated projectile points have been reported from both these sites, but evidence of actual Paleoindian occupation has not been confirmed for either site.

Only one of the projectile points recovered from the Park is a Clovis point and, thereby, assignable to the Early Paleoindian period. Five of the remaining projectile points are assignable to the Late Paleoindian period. The seventh Paleoindian projectile point was one recorded by Sloan and Schwartz (1960:17) as simply a "fluted point fragment;" thus, the type of point and exact time period for this find is unknown.

Tankersley (1988) reported the recovery of the sole Clovis point recovered from the Park. It was made from Hixton Silicified Sandstone, a lithic material not found within Kentucky. In a 1978 proposal for

archaeological survey and testing of selected areas in Mammoth Cave National Park, Jack Schock stated that a Paleoindian Clovis point in the John Nelson collection housed at Western Kentucky University was found atop Indian Hill (MACA-78), but according to Terry Langford (personal communication, 1990) none of the artifactual materials currently found in the John Nelson collection that have been attributed to Indian Hill are assignable to the Paleoindian period. It is possible that the Clovis point made of Hixton Silicificed Sandstone now currently held by private collector, Clem Caldwell of Danville, Kentucky, and reportedly found "near the Historic Entrance of Mammoth Cave" (Tankersley 1988:62) is the Clovis point reported by Schock as having come from Indian Hill - Top (MACA-78).

Carstens' survey recovered two of the five Late Paleoindian points known to come from Mammoth Cave National Park--a Quad projectile point from Horizon II of the Patch Rockshelter (MACA-43) (Carstens 1980:115) and a Quad type projectile point from the surface of Blue Spring Hollow Rockshelter (MACA-37) (Carstens 1980:449).

The author's surveys of Mammoth Cave have produced what appear to be three more examples of Late Paleoindian points; one was deposited at the Jaggers Ridge Rockshelter site (MACA-65), the second at the Dennison Ridge site (MACA-133), and the third at Elmore Rockshelter (MACA-160). The Jaggers Ridge Rockshelter site was classified as a Dalton point; the points from Dennison Ridge and Elmore Rockshelter appear to have been Beaver

Lake points. At four of these sites, the projectile points are probably prehistoric "finds" deposited at the sites by Indians postdating the Paleoindian period. The Dalton point found at Jaggers Ridge Rockshelter was found in a looter's back-dirt pile, so it is possible that a Late Paleoindian occupation is present at the site. In the case of the Dennison Ridge and Elmore Rockshelter sites, both points have been reworked into Matanzas Side Notched points datable to the Late Archaic.

The remaining Paleoindian projectile point was recorded by Sloan and Schwartz (1960:17) as a "fluted point fragment" from the Mc 2 site. The type of point in reference is unknown. The exact location of this site has also yet to be determined although it is apparently located somewhere on the "old Webb farm" in the northwest portion of the Park (Sloan and Schwartz 1960:17).

The Archaic Period (8000-1000 B.C.)

The Archaic period follows the Paleoindian, and has generally been dated from ca. 8000 B.C. to 1000 B.C. (Jefferies 1990a, 1990b). The Archaic tradition in Kentucky is typically interpreted as a period during which: (1) the environment changed from a "mosaic" conifer forest to a closed canopy hardwood forest habitat; (2) the population of hunter/gatherer bands grew; and, (3) people became more sedentary (Caldwell 1958; Fowler 1959; Jefferies 1990b; Marquardt and Watson 1983b; Phillips and Brown 1983; Price and Brown 1988). These changes formed the basis for regional adaptations in subsistence, resource utilization, and artifact manufacture.

Within the Archaic tradition, three subperiods are generally recognized: Early Archaic (8000-6000 B.C.), Middle Archaic (6000-3000 B.C.), and Late Archaic (3000-1000 B.C.). Each of these subperiods is generally identified by different projectile point styles. In the Mammoth Cave area, Early Archaic projectile point styles include Big Sandy I, Kirk Serrated, Kirk Corner Notched, Thebes, and Lost Lake. Middle Archaic projectile point styles include Big Sandy II, White Springs, Stanly Stemmed, and Morrow Mountain. Projectile point styles traversing the Middle to the Late Archaic periods include Elk River Stemmed and Benton points. Late Archaic projectile point styles of the Mammoth Cave area include Matanzas Side Notched, Saratoga Broad Bladed, Ledbetter Stemmed, Tablerock, Bottleneck Stemmed, Merom, Lamoka, McWhinney Heavy Stemmed, and Karnak Unstemmed. Projectile point styles spanning the Late Archaic to Early Woodland periods include Turkey-tail, Little Bear Creek, and Gary Contracting Stemmed.

The changes in different projectile point styles during the Archaic period are usually interpreted as reflecting increasing numbers of socially distinct groups and changing subsistence modes. Archaic lifeways have usually been thought of as consisting of semi-nomadic bands that occupied separate territories in which they moved seasonally to take advantage of different natural resources as they ripened or became more easily exploitable within a woodland environment (Smith 1986; Steponaitis 1986). The seasonal relocation of social groups to take advantage of the different resources is reflected in the

different types of sites found along the Green River. Rockshelters in the Mammoth Cave area appear to have been primarily used as fall and winter sites by individual family groups that focused on gathering nuts and hunting deer and turkey (Carstens 1980; Prentice 1990a) while open-air sites on the Green River floodplain in the Big Bend area appear to have been occupied during the summer and early fall when deer, fish, freshwater mussels, plant seeds, fruits, and nuts were heavily exploited (Webb 1974; Marquardt and Watson 1983a, 1983b). Based on their continued reoccurrence in the archaeological record, the most important food resources of the Archaic period in the Mammoth Cave and Green River area appear to have been deer, raccoon, turkey, hickory nuts, acorns, seeds, fruits, and freshwater shellfish. The artifactual assemblage of the Archaic period reflects this focus on deciduous woodland resources, and includes such implements as bone awls, fishhooks, stone axes, nutting stones, bell-shaped pestles, drills, atlatl weights, and the ever-present projectile points.

By the Late Archaic period, wide-spread regional trading networks were developed which included the exchange of copper, marine shell, soapstone, and other items (Webb 1974; Winters 1968; Elliot 1986). The gardening of domesticated plants had also been added to the cultural milieu. Late Archaic groups had much more diverse tool assemblages than their predecessors, reflecting more sophisticated exploitation of their local environments and a more sedentary existence. Mortuary practices and shamanistic paraphernalia,

such as bone tubes (blowing tubes), medicine bags, marine shell cups, intentionally breaking grave objects prior to burial, and the sprinkling of red ochre in graves, indicate that at this time a complex cosmology had been developed with an emphasis on animal symbolism and the belief that supernatural or spiritual forces could be influenced through proper ritual (Prentice 1986a). In the Mammoth Cave area, the development of trade systems and a greater emphasis on ritual may have precipitated the first archaeologically detectable exploitation of mineral salts in Salts and Mammoth Cave, which was initiated during the terminal portion of the Late Archaic (Watson 1974).

Perhaps the most significant change in the lifestyles of Archaic period peoples was the adoption of plant horticulture during the later portion of the Archaic period (Ford 1985). The process by which Archaic peoples adopted the practice of purposefully manipulating plants as a way of increasing plant resource availability is still open to debate (cf. Prentice 1986a; B. Smith 1987; Watson and Kennedy 1988; Watson 1990). Most archaeologists today believe that plant domestication was an independent development in the eastern United States, with the earliest manipulated plants including cucurbits (gourds), sumpweed, and chenopodium (Crites 1991; Smith 1989; Gremillion 1993). It was once thought that the first domesticated plants were adopted from Mesoamerica into the eastern U.S. along with the idea of horticulture (Kay et al. 1980; Ford 1981; King 1985). Although these two theories are

usually viewed as being in opposition to one another, there is the possibility that the truth lies somewhere between the two, that both areas were experimenting in plant domestication and that plants or/and ideas were being exchanged in both directions. Although the arrival of horticulture signals the beginning of new human/plant relationships in the Southeast, it appears that horticulture did not contribute a significant portion of the diet until Woodland times.

A total of 63 sites within the Park have produced artifacts that are datable to the Archaic period (Figures 4-6, Table 6). Of these, twelve are artifact scatters located in the uplands, two are artifact scatters located in the bottomlands, 47 are caves and rockshelters, and one is an isolated find. The Early Archaic sites consist of two upland sites (17%), one bottomland site (8%), and nine rockshelter/caves (75%). Six upland sites (26%) and 17 rockshelter/cave sites (74%) are attributable to the Middle Archaic period. Late Archaic sites are composed of ten upland sites (19%), one bottomland site (2%), 41 rockshelter/cave sites (77%), and one isolated find (MACA-68).

The Woodland Period (1000 B.C.-A.D. 900)

The Woodland period is usually characterized as the period of transition from the preceding basically egalitarian hunter/gatherer groups of the Archaic period to the more complex, horticultural, chiefdom-level Mississippian societies that followed. Woodland societies are often viewed as "tribal" or "big man" type social organizations (Braun 1977; Braun and Plog 1982; Griffin

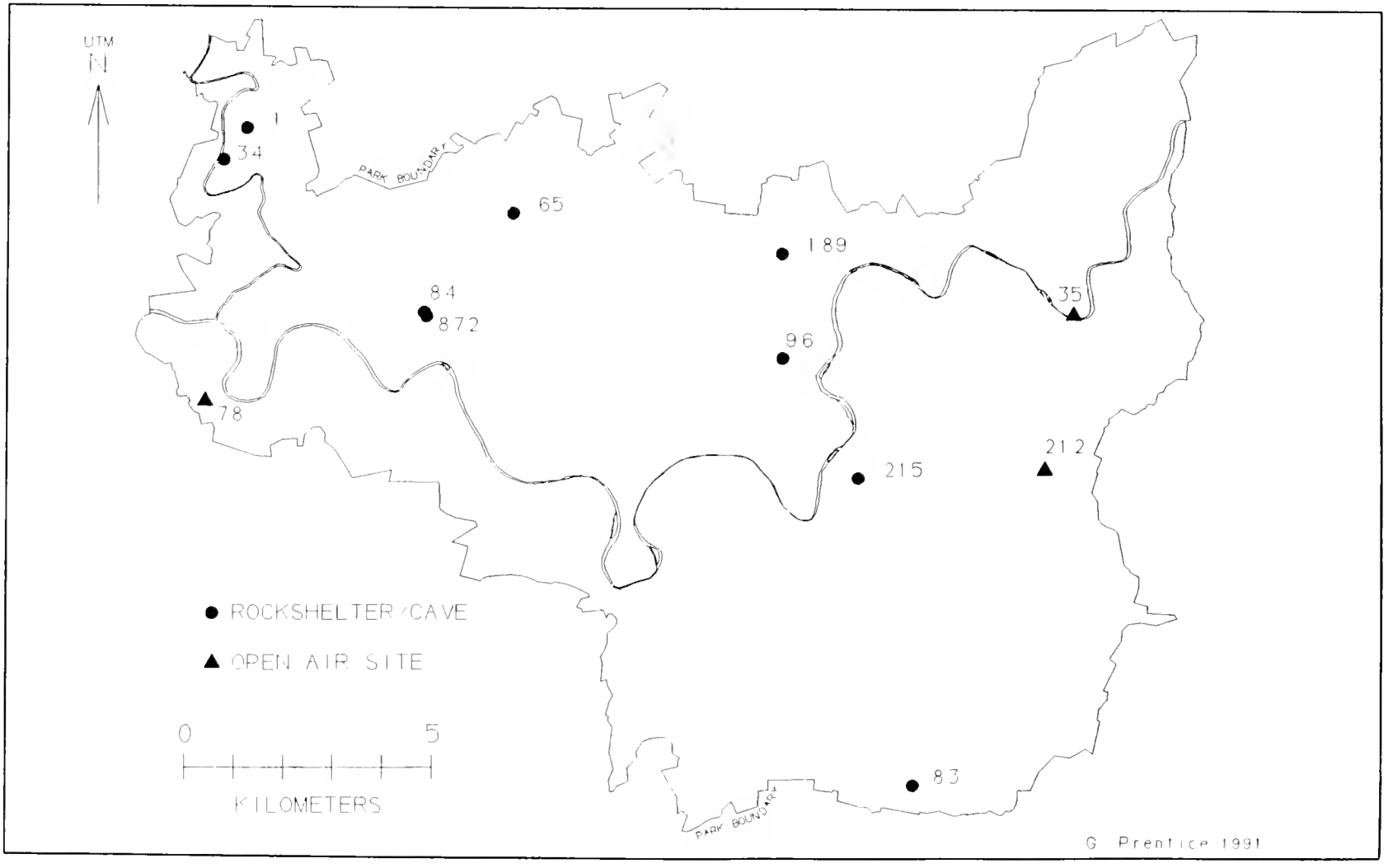

Figure 4. Early Archaic Period Sites in Mammoth Cave National Park.

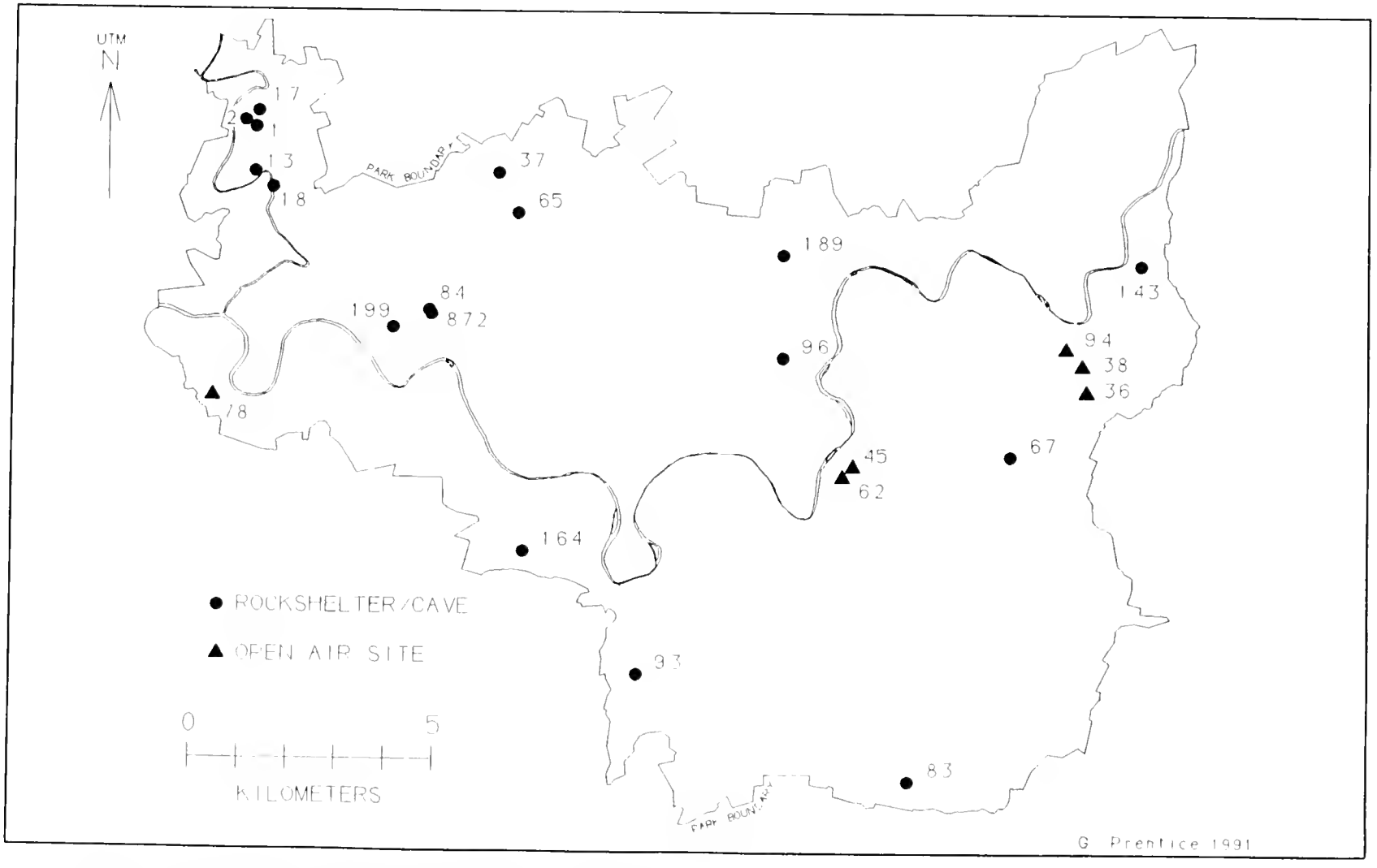

Figure 5. Middle Archaic Period Sites in Mammoth Cave National Park.

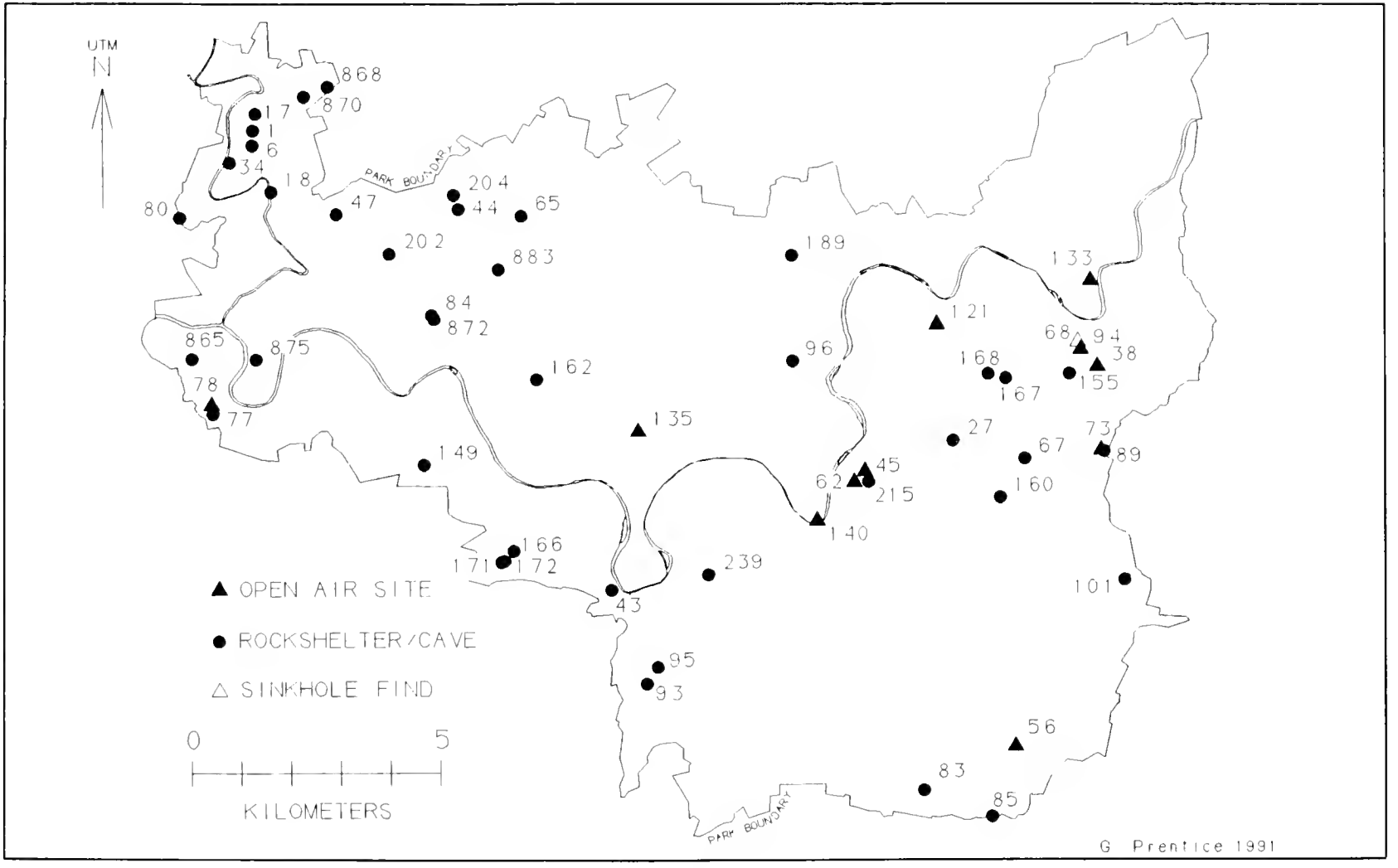

Figure 6. Late Archaic Period Sites in Mammoth Cave National Park.

Table 6. Known Archaic Period Sites Located Within MCNP.

	Upland	Bottomland	Rockshelter/ Cave
EARLY ARCHAIC	MACA-78, 212	MACA-35	MACA-1, 34, 65, 83, 84, 96, 189, 215, 872
MIDDLE ARCHAIC	MACA-36, 38, 45, 62, 78, 94		MACA-1, 2, 13, 17, 18, 37, 65, 67, 83, 84, 93, 96, 143, 164, 189, 199, 872
LATE ARCHAIC	MACA-38, 45, 56, 62, 73, 78, 94, 121, 133, 135	MACA-140	MACA-1, 6, 17, 18, 27, 34, 43, 44, 47, 65, 67, 77, 80, 83, 84, 85, 89, 93, 95, 96, 101, 149, 155, 160, 162, 166, 167, 168, 171, 172, 189, 202, 204, 215, 239, 865, 868, 870, 872, 875, 883

1983; Milanich et al. 1984; Muller 1983; Tainter 1975; Smith 1986), although it has been suggested that chiefdom level societies may have developed by the Middle Woodland (Seeman 1979a). Along with this increasing social complexity were changes in technology, economy, religious and mortuary ceremonialism, and settlement types (Brose and Greber 1979; Farnsworth and Emerson 1986; Griffin 1983; Jennings 1974; Muller 1983).

The Woodland period is generally dated from 1000 B.C. to A.D. 1000, but the chronological termination of the Woodland period at A.D. 900 is adopted here, following the example set by Lewis (1990). The Woodland period is generally divided into three subperiods: Early Woodland (1000-200 B.C.), Middle Woodland (200 B.C.-A.D. 500), and Late Woodland (A.D. 500-900). Each of these subperiods is generally identified by different ceramic types and projectile point styles.

In the Mammoth Cave area, projectile point types assignable to the Early Woodland period include Turkey-tail, Gary Contracting Stemmed, Little Bear Creek, Wade, Motley, Dickson, and Adena Stemmed. Middle Woodland projectile point types found in the Mammoth Cave area include Copena Triangular, Snyders, and Bakers Creek. Point styles traversing the Middle through Late Woodland periods include Lowe Flared Base and Chesser Notched. Late Woodland points in the Mammoth Cave area include Jacks Reef Pentagonal, Hamilton, and Madison points.

It was during the Woodland period that ceramic manufacture became a widespread technology among native American groups in Kentucky. The temporal sequence of Woodland ceramics in the Mammoth Cave area is still poorly understood due to the fact that only a few sites containing undisturbed, clearly separable Woodland occupations have been excavated. General trends are distinguishable, however.

The earliest pottery types were thick-walled and tempered with a variety of aplastic materials, including chert and limestone. In west-central Kentucky these earliest of the ceramic types are usually called Fayette Thick (Clay 1980). The surface treatment on Fayette Thick includes smoothed and cordmarked exterior surfaces with cordmarking predominating and fingernail impressions sometimes superimposed upon the cordmarking (Clay 1980). The current evidence would suggest a date somewhere between 1000 to 500 B.C. for the manufacture of this ceramic type, but as yet Fayette Thick pottery has been reported very infrequently in the Mammoth Cave area, and none of it has come from dated contexts. None of the ceramics collected during the Project were assigned to this type.

Toward the end of the Early Woodland period, more pottery types appear in rare numbers in the Mammoth Cave area. One of these types has been called Crab Orchard Fabric Impressed (Prentice 1990b). This pottery type exhibits an exterior surface treatment consisting of parallel impressions

with cord-wrapped dowels or with the edges of cord-wrapped paddles which resulted in a pattern resembling fabric impressions.

Crab Orchard Fabric Impressed was previously called Baumer Fabric Impressed (Clay 1963; Hanson 1960), but the type Baumer Fabric Impressed has since been reclassified and assigned to the type Crab Orchard Fabric Impressed (Butler and Jefferies 1986). In southern Illinois, the earliest Crab Orchard Fabric Impressed pottery is defined as "grit"-tempered where the grit consists primarily of crushed rock, although limestone-tempering does occur. Through time "clay" was added as a temper, and eventually, clay replaced grit as the primary temper type. Crab Orchard Fabric Impressed has been dated as early as 540 B.C. +/- 60 at the Landreth No. 1 site in southern Illinois (Butler and Jefferies 1986), and apparently occurs as late as A.D. 1, but by that time is a minority ware (Butler and Jefferies 1986:528). Only one sherd recovered during the Project was assigned to the type Crab Orchard Fabric Impressed, which is defined here as being rock-tempered and fabric impressed, but this assignment is questionable given the eroded nature of the sherd (Prentice 1990b). Hanson (1960) has indicated, however, that Crab Orchard (Baumer) Fabric Impressed does occur infrequently in the Green River drainage.

One sherd collected during the Project was assigned to the type Long Branch Fabric Marked in order to distinguish this limestone-tempered fabric impressed sherd from the previously defined rock tempered Crab Orchard

Fabric Impressed sherd, but this assignment can likewise be questioned due to the eroded nature of this sherd (Prentice 1990b). An argument can also be made that this sherd should be classified as Crab Orchard Fabric Impressed because it is more typical of Crab Orchard both in texture and thickness than "true" Long Branch Fabric Marked and should, therefore, be assigned to the former category. The decision was made, none-the-less, to call the sherd Long Branch Fabric Marked because the appearance of limestone tempering in the Green River valley is probably of temporal significance, and some means should be employed to distinguish limestone tempered fabric impressed ceramics from rock tempered fabric impressed ceramics. The argument is somewhat minor, however, given the eroded nature of the sherds and the relative contemporaneity of the two pottery types. Long Branch Fabric Marked pottery appears at sites in Tennessee and Alabama sometime around 400 B.C. (Faulkner and Graham 1965:86; Faulkner and Graham 1966:113-116; Futato and Solis 1983).

Three pottery types assignable to the Early Woodland through Middle Woodland periods have recently been reported and assigned to the Plum Springs phase by Schock (Schock and Dowel 1981, Schock 1987). These types have been tentatively named Plum Springs Cordmarked, Plum Springs Plain, and Plum Springs Smoothed Over Cordmarked (Prentice 1990b). These pottery types were defined on the basis of rock tempering in the sherds, sometimes in combination with grog tempering (crushed sherds). In many

respects, these ceramic types may be considered local varieties of Crab Orchard Cord Marked, and Crab Orchard Plain (Butler and Jefferies 1986). Schock and Dowel (1981) reported radiocarbon determinations of 950 B.C. +/- 100, 475 B.C. +/- 145, 160 B.C. +/- 105, and 65 B.C. +/- 65 from three pit features at the type site (15Wa981) upon which the Plum Springs phase was defined. The 950 B.C. date appears to be somewhat early, and probably should be disregarded in dating the Plum Springs ceramic assemblage. Ceramics assigned to this type may also date later than the Middle Woodland period.

By the Middle Woodland period, ceramics are more common in the Mammoth Cave area, but they have never been found in abundance at any sites in the Park. Most of the pottery types appearing in the Middle Woodland continue to be made until the Late Woodland period, making chronological assignment of sites on the basis of ceramics during the Middle and Late Woodland somewhat problematic. The pottery types that appear to transcend the Middle to Late Woodland periods include: Rough River Plain, Rough River Cordmarked, Rough River Smoothed Over Cordmarked, Mulberry Creek Cord Marked, Mulberry Creek Plain, Blue Lake Cordmarked, Blue Lake Smoothed Over Cordmarked, and sand-tempered plain pottery that was referred to as O'Neal Plain (Prentice 1990b:45) prior to finding that for most archaeologist this term has come to refer solely to plain wares in the Alexander series of northern Alabama (Futato 1977:162). Consequently, another term for sand-tempered plain pottery, Kennett Plain (Phillips 1970:94-95; Prentice 1990b:45)

has been adopted here. One pottery type that appears to be restricted to the Middle Woodland period can be identified, however; this pottery type is Rough River Simple Stamped (Hanson 1960; Carstens 1980).

Rough River Simple Stamped is a limestone tempered ware with simple stamped exterior and smoothed interior. The stamped designs on the exterior of the vessels was produced by paddling with a tool with parallel grooves incised into it. According to Carstens (1980:121) this pottery style reached its peak in popularity during the late Middle Woodland period (A.D. 400 to A.D. 600). Rough River Simple Stamped has a morphological correlate in Bluff Creek Simple Stamped pottery found in Owl Hollow phase and Candy Creek series ceramic assemblages to the south in Tennessee. During the Owl Hollow Phase, A.D. 200-600, limestone tempered Bluff Creek Simple Stamped pottery constitutes a small but significant portion of the ceramic assemblage in the upper Duck River and Elk River drainages of Tennessee (Faulkner 1978). Apparently, Bluff Creek Simple Stamped ware is no longer made by the end of the Owl Hollow phase (Faulkner 1978). Bluff Creek Simple Stamped also occurs among the limestone-tempered Candy Creek ceramic series at the Ice House Bottom site on the Little Tennessee River (Chapman 1973; Chapman and Keel 1979) and in the middle Tennessee River valley of northern Alabama and southeastern Tennessee (Haag 1939:14; Walthall 1980).

The Early Woodland period was a time of horticultural expansion with the cultivation of a number of locally domesticated seed-bearing plants

(sunflower, maygrass, goosefoot, sumpweed and other similar plants). The adoption of horticulture as a means of providing a significant portion of the diet appears to have been an early development in the Green River/Mammoth Cave area (Watson 1985; Yarnell 1974b; Gardner 1987). There was, however, a continued reliance on the hunting and gathering of wild animal and plant foods to provide the major portion of the diet.

Archaeological investigations by Patty Jo Watson and her colleagues in Salts and Mammoth Caves (Watson 1966, 1969, 1974) and in the Big Bend area of the Green River (Marquardt and Watson 1983a, 1983b) have significantly added to our knowledge of the early adoption of horticulture during the Late Archaic and Early Woodland periods and the cultural circumstances under which it was adopted. Our knowledge of plant use during the Early Woodland period has been particularly expanded by Watson and her colleagues' investigations of Salts Cave (Watson 1969, 1974; Gardner 1987). Examination of the gourd and squash remains found in the cave passages, the visceral contents of Little Al, the paleofeces recovered in the cave, and the plant remains recovered in flotation samples from the Vestibule of Salts Cave have allowed archaeologists to evaluate the importance of wild and domesticated foods in the diets of the Early Woodland cavers. The evidence shows a heavy reliance on storable, starchy seeds produced by domesticated varieties of sunflower, maygrass (*Phalaris* sp.), goosefoot (*Chenopodium* sp.), and sumpweed (*Iva* sp.). There was also a heavy reliance on hickory nuts and

wild animals, including deer, turkey, rabbit, box turtle, squirrel, raccoon, skunk, groundhog, and fish, as sources of food, feathers, bones, antlers, and hides.

Watson's investigation of the Salts Cave Vestibule has also added to our knowledge of the prehistoric treatment of the dead. During excavations in the Vestibule of Salts Cave, Watson recovered nearly 2000 disarticulated human bone fragments mixed among the rest of the site refuse (Robbins 1974). Most of the bones were broken, and roughly 25 percent of the bones were burned to some degree; many of the bones exhibited cut marks. Other forms of human bone modification were present in the form of awls fashioned from tibiae and fibulae shafts.

Robbins' (1974) analysis of the human remains collected by Watson from Salts Cave Vestibule indicated that at least 41 individuals were represented. The age and sex distribution of these individuals included three fetuses, five infants, six young children (ages six to ten years), four adolescents, six adult males, eight adult females, and nine unsexed adults. Robbins (1974:160) offered two possible hypothesis to explain the cut marks, breakage, and burning she found during her analysis of the human bone.

Her first hypothesis was that the cut marks on the bones were the result of the defleshing of skeletons as part of the prehistoric Salt Cavers' burial ritual. She suggested that after the skeletons were defleshed outside the cave, the bones were broken, then carried to the cave for burial in "the kitchen

midden" present within the Vestibule (Robbins 1974:160). Following burial, accidental burning of the bones occurred as a result of the building of campfires. The breakage and burning of the bones did not follow a pattern which Robbins could explain as a result of cremation practices. Robbins' second hypothesis was that the cut, broken, and burnt human remains were the result of cannibalism. The splintering and indiscriminate scattering of human bones among the rest of the Vestibule refuse, she argues, fits the pattern one would expect from cannibalistic behavior (Robbins 1974:161).

At one time, Watson appears to have favored the cannibalism hypothesis. In her *Archeology of the Mammoth Cave Area*, she makes the following comment.

> Fragments of animal bone make up by far the largest proportion of material recovered, and indicate the hunting and eating of deer plus a series of smaller mammals. Together with the remains of game animals are many broken, splintered, and sometimes charred pieces of human bone, giving one the strong impression that the Vestibule dwellers were at least part-time cannibals [Watson 1974:83].

Seeman (1986) has since offered an alternative interpretation for the pattern of broken and burned human remains recovered in the Vestibule area of the site. Seeman's argument is similar to Robbins's first hypothesis in that it evokes the formerly common Indian practice of defleshing the bones of the dead prior to burial. Seeman suggests that Salts Cave Vestibule was the final repository for human remains that were originally processed elsewhere and were reburied at Salts Cave. The animal food remains and most of the other

artifactual debris, he suggests, were part of the elaborate mortuary ceremonialism associated with the processing of the human remains eventually interred at Salts Cave. During the mortuary process, human bones were lost, broken, burned, and mixed with faunal remains, a pattern which Seeman notes occurred at other Early Woodland mortuary sites. Today, Seeman's theory seems to be a more plausible explanation for the presence of human bones in Salts Cave than does the argument for cannibalism. The prehistoric use of caves for burial activities is well represented among the other caves in the vicinity including Mammoth, Short, Haunted, and Bone (and possibly Longs), and there are no other types of sites where human remains appear to have been used as food.

New ideas have also been forthcoming regarding the nature of Early Woodland mineral exploitation within Salts Cave following Watson's groundwork. Watson (1966, 1969, 1974) was able to document the extensiveness of the prehistoric mining of minerals within the caves and the apparent business-like nature of the Indian miners. More recently, Tankersley and his colleagues have spent considerable time documenting the prehistoric mining practices used in Salts and Mammoth Cave and have identified the extraction of selenite, satinspar, mirabilite, and gypsum crust using three different forms of mineral procurement: scraping mineral crusts and flowers from walls, digging and sifting of cave sediments, and ledge mining -- the sweeping of cave ledges to encourage crystal growth (Tankersley 1989;

Tankersley et al. 1985; Munson et al. 1989). The extensive nature of this mining activity has led Tankersley to the same conclusion that Watson did: some of these minerals were used in trade within the wide-reaching exchange networks of the time (Tankersley 1989) and would have been valued for their medicinal properties as well as their presumed magico-religious qualities.

The Middle Woodland period, which follows the Early Woodland period, is noted as being a period of increased mortuary/ceremonial activity and far-reaching trade networks in large portions of the eastern United States (Brose and Greber 1979; Seeman 1979b; Goad 1979; Walthall et al. 1979, 1980), but the peoples living in the Mammoth Cave area did not participate in these endeavors to any significant degree. Indeed, no earthen mounds characteristic of Middle Woodland mortuary practices have been reported in the vicinity of the Park (although the possibility exists that three such mounds exist near Kyrock). Also, none of the highly decorated ceramics or ornate objects (ear spools, pan pipes, etc.) made of copper, shell, mica, and other exotic materials found at many Middle Woodland sites have been found in the Mammoth Cave area. For reasons yet unknown, the far-reaching exchange networks that included the Green River peoples during the Late Archaic and Early Woodland periods were altered so that the Middle Woodland Green River peoples no longer participated. In fact, the most notable development to occur in the Mammoth Cave area during the Middle Woodland period is the apparent abandonment of cave exploration and mining of cave minerals (Watson 1985).

This prehistoric abandonment of the caves may be related to the apparent changes noted in the regional trade networks, or it may be related to the introduction of maize (corn) and the simultaneous transmission of new ideas concerning the origin of plants, the underworld, and caves. During the Middle Woodland period, maize was first introduced into the eastern U.S., apparently from the southwestern United States (Ford 1985). It has been argued that this transmission of maize was also accompanied by new planting methods, new myths explaining the origin of maize, and new ideas about life and death (Witthoft 1949). Ethnohistoric and archaeological studies of Native American groups that grew maize have shown that caves were often viewed as openings into the underworld, the abode of the souls of the dead (Hudson 1976; Prentice 1986c). It is possible that the cessation of cave mineral exploitation during the Middle Woodland period was related to the adoption of ideas concerning the relationship between caves, the underworld, and the land of the dead.

Although maize was first introduced into the eastern U.S. during the Middle Woodland period, it wasn't until the very end of the Late Woodland period that maize provided a significant portion of the Indian diet (Keegan 1987). The increased emphasis toward producing more of the food through horticulture was also accompanied by changes in hunting technology. During the Late Woodland period, the bow and arrow replaced the atlatl and dart (small throwing spear) as the primary means of hunting (Justice 1987). This development is signaled by the appearance of smaller, light-weight projectile

point styles. These new projectile point types include Madison, Hamilton Incurvate, and Jack's Reef Pentagonal.

Despite these significant changes, Late Woodland peoples continued to follow lifeways similar to their predecessors. Wild plants and animals continued to be important sources of food, and a schedule of seasonal movements was followed to take advantage of different resources as they became available. This included fall encampments by family groups at larger rockshelters, like Blue Spring Hollow Rockshelter, where processing of hickory nuts was a major activity (Wagner 1978; Carstens 1980). Deer hunting was also an important pursuit at these sites.

A total of 68 sites in the Park have produced artifacts that are assignable to the Woodland period (Figures 7-9; Table 7). Of these, nine are artifact scatters located in the uplands, two are artifact scatters located in the bottomlands, and 58 are rockshelters and caves. Early Woodland sites consist of one bottomland site (2%), nine upland sites (22%), and 33 rockshelter/caves (76%). Middle Woodland sites are represented by one bottomland site (3%), four upland sites (13%), and 26 rockshelter/caves (84%). Late Woodland sites are represented by three upland sites (11%) and 24 rockshelter/caves (89%).

Late Woodland/Mississippian Sites

Thirteen sites had cultural components that could not be assigned to a temporal category more specific than either the Late Woodland or Mississippian periods (Figure 10). These are sites that produced triangular

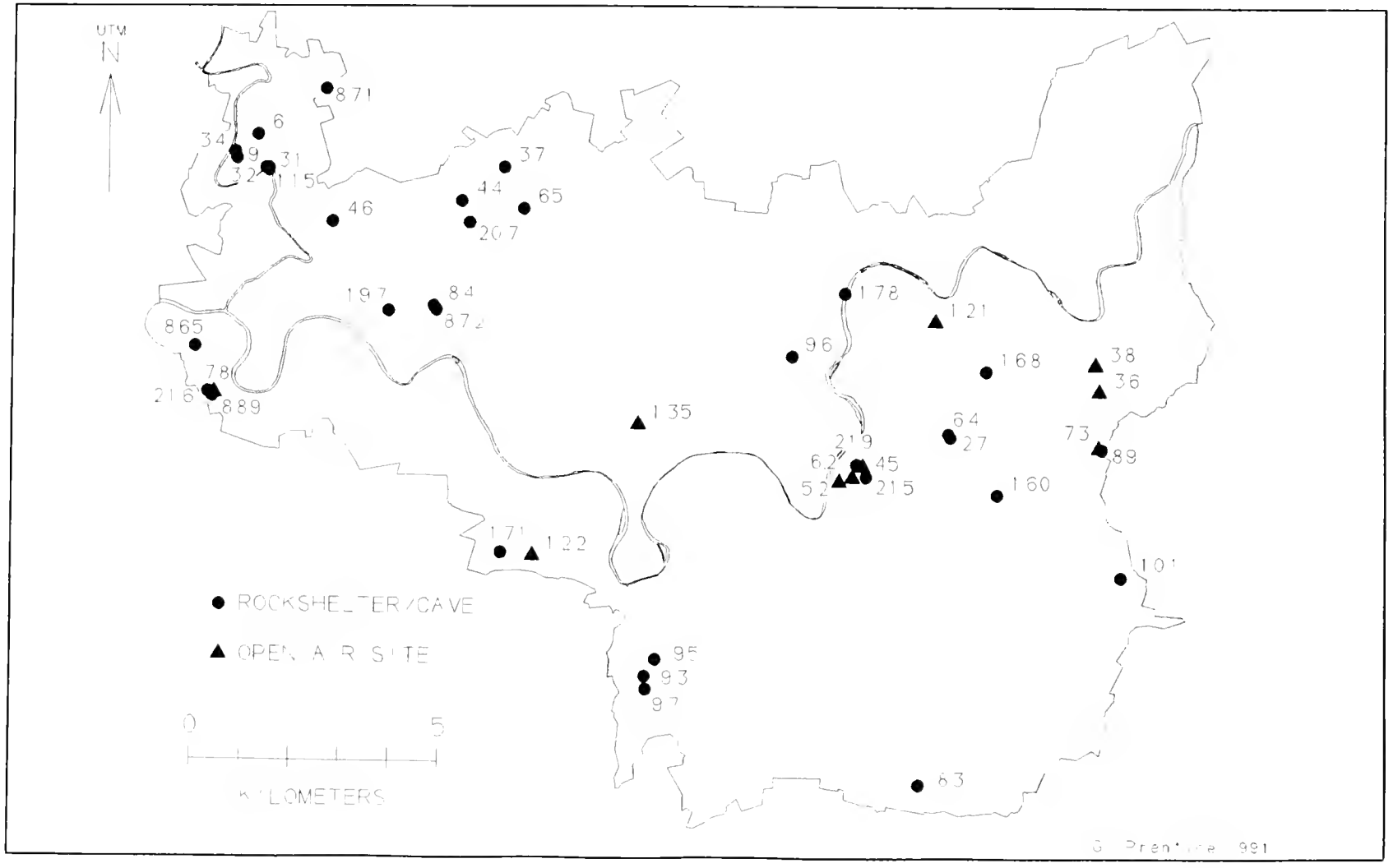

Figure 7. Early Woodland Period Sites in Mammoth Cave National Park.

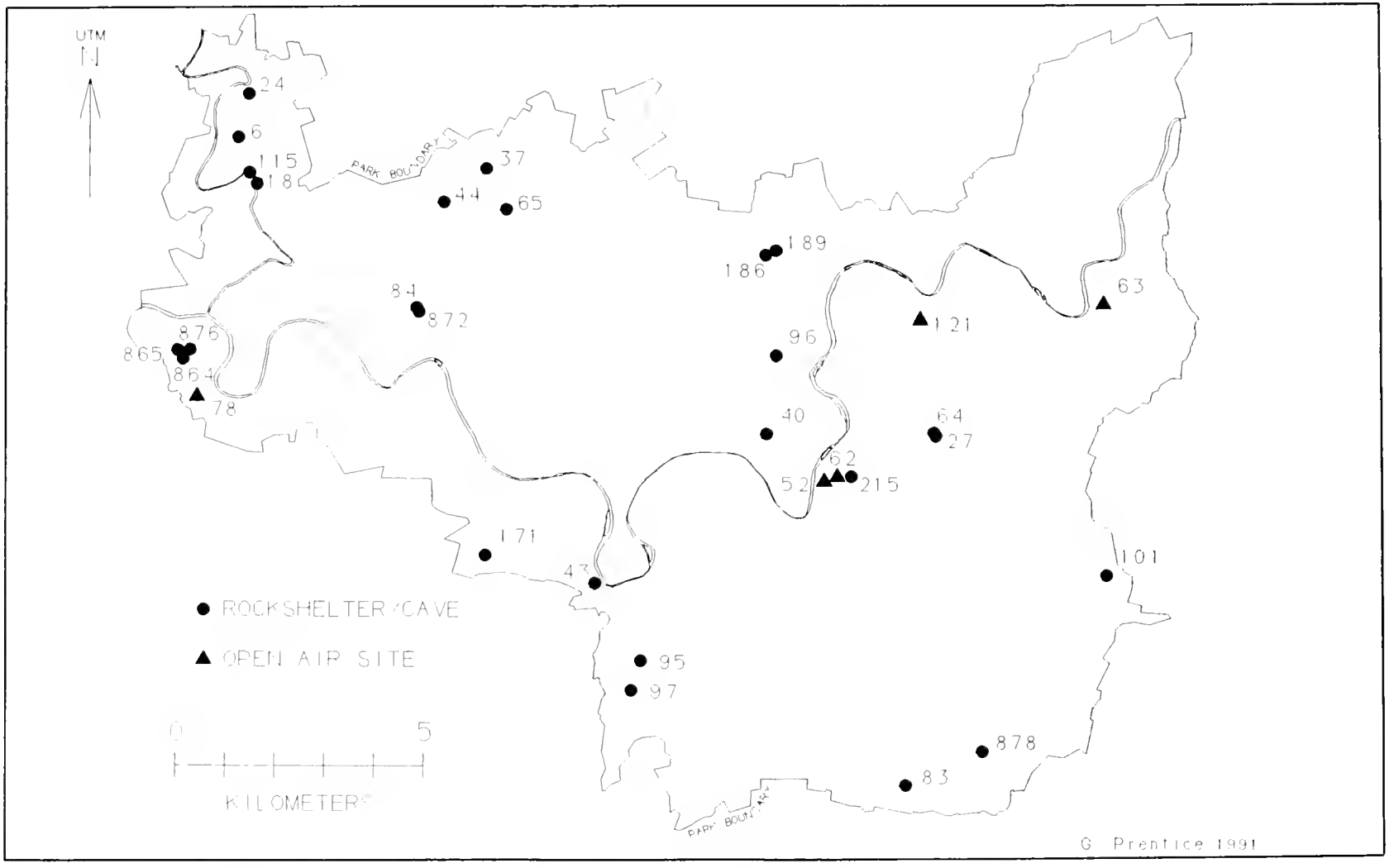

Figure 8. Middle Woodland Period Sites in Mammoth Cave National Park.

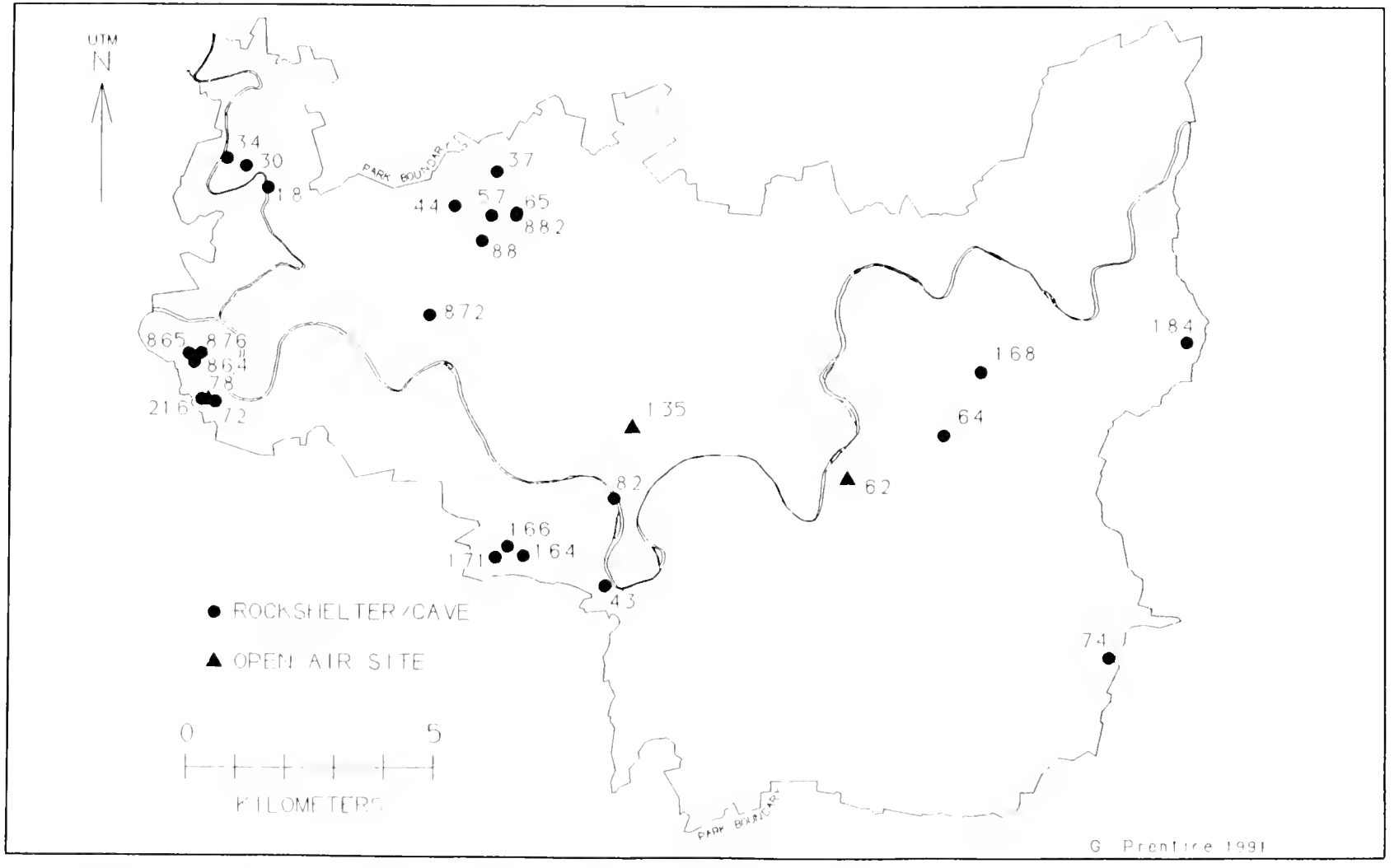

Figure 9. Late Woodland Period Sites in Mammoth Cave National Park.

Table 7. Known Woodland Period Sites Located Within MCNP.

	Upland	Bottomland	Rockshelter/ Cave
EARLY WOODLAND	MACA-36, 38, 45, 62, 73, 78, 121, 122, and 135	MACA-52	MACA-6, 9, 27, 31, 32, 34, 37, 44, 46, 64, 65, 83, 84, 89, 93, 95, 96, 97, 101, 115, 160, 168, 171, 178, 197, 207, 215, 216, 219, 865, 871, 872, 889
MIDDLE WOODLAND	MACA-62, 63, 78, 121	MACA-52	MACA-6, 18, 24, 27, 37, 40, 43, 44, 64, 65, 83, 84, 95, 96, 97, 101, 115, 171, 186, 189, 215, 864, 865, 872, 876, 878
LATE WOODLAND	MACA-62, 78, 135		MACA-18, 30, 34, 37, 43, 44, 57, 64, 65, 72, 74, 82, 88, 164, 166, 168, 171, 184, 216, 864, 865, 872, 876, 882

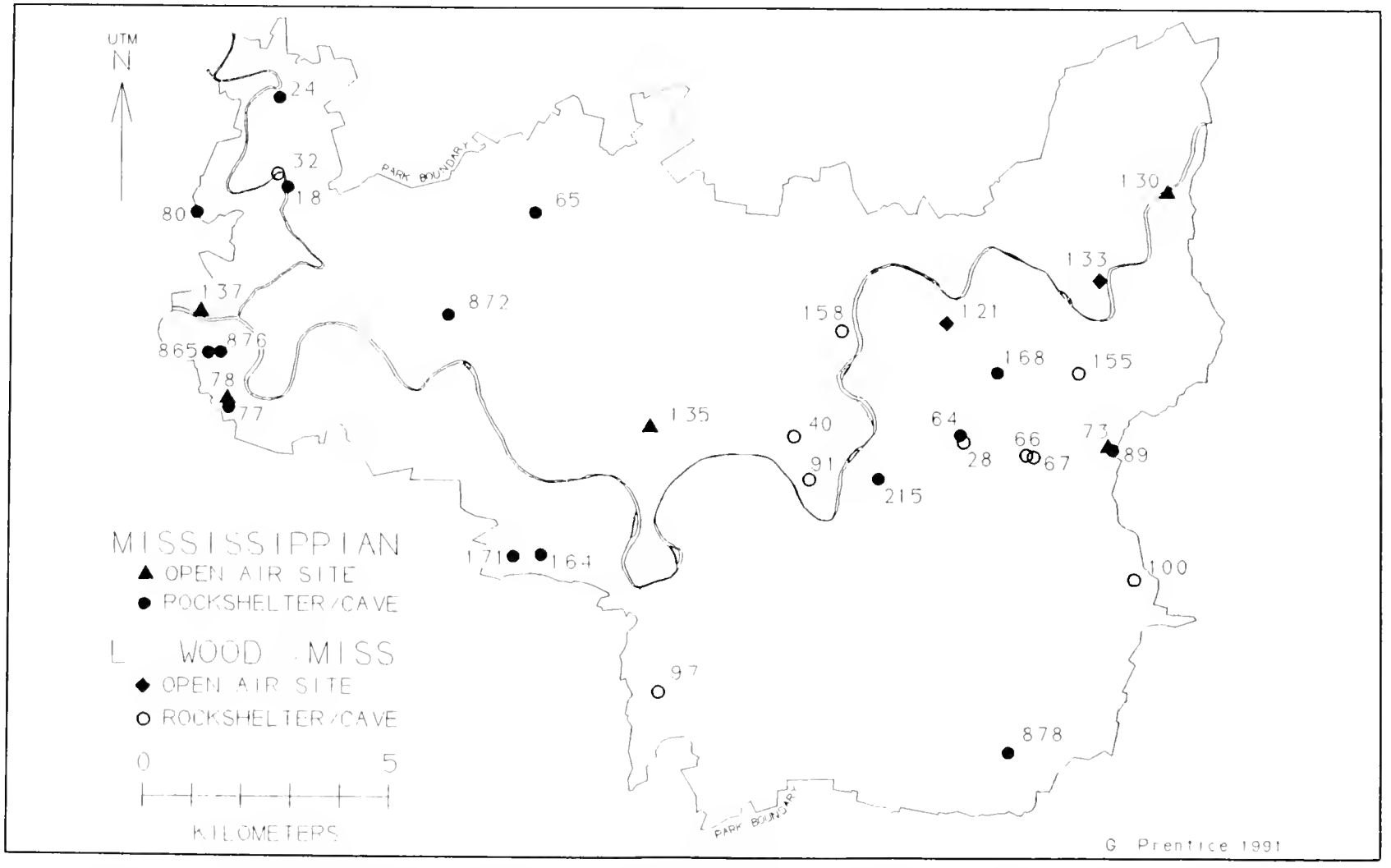

Figure 10. Late Woodland/Mississippian and Mississippian Period Sites in Mammoth Cave National Park.

projectile points but no other diagnostics that could be used to assign the sites to either the Late Woodland or Mississippian periods. Triangular projectile points became the most common projectile point form in the eastern United States following the widespread adoption of the bow and arrow during the Late Woodland period. Of the thirteen sites considered here, two are artifact scatters located in the uplands (MACA-121, MACA-133), and eleven are rockshelters (MACA-28, MACA-32, MACA-40, MACA-66, MACA-67, MACA-70, MACA-91, MACA-97, MACA-100, MACA-155, MACA-158).

The Mississippian Period (A.D. 900-1500)

The Mississippian period follows the Woodland, and terminates with the arrival of the first Europeans to America. The dating of this period is usually placed from A.D. 1000-1500; however, following Lewis' (1990) example, a beginning date of A.D. 900 for the period is adopted here. Lewis' (1990) termination of the Mississippian period at A.D. 1700 is not adopted here, however.

In the western portions of Kentucky, the Mississippian period has been subdivided into subperiods or phases that can be classified as Early, Middle, and Late Mississippian. These date roughly to A.D. 900-1100, A.D. 1100-1300, and A.D. 1300-1500, respectively (Lewis 1990). Such a refined chronology is lacking in the Mammoth Cave area, however.

A total of 22 sites in the Park are assignable to the Mississippian period (Figure 10). Two of them are bottomland sites (MACA-130 and MACA-137),

three sites are upland scatters (MACA-73, MACA-78, MACA-135), and 17 are rockshelter/caves (MACA-18, MACA-24, MACA-30, MACA-37, MACA-64, MACA-65, MACA-77, MACA-80, MACA-89, MACA-164, MACA-168, MACA-171, MACA-215, MACA-865, MACA-872, MACA-876, and MACA-878). In all but three cases, the reason for assigning each site to this category has been the presence of shell-tempered pottery. The exceptions to this rule are: (1) Salts Sink Surface (MACA-73), which has produced numerous triangular and triangular, side-notched projectile points (Sloan and Schwartz 1960:21); (2) Indian Hill - Top (MACA-78), which has produced numerous triangular projectile points and stone box graves; and, (3) Lindseyville Rockshelter #2 (MACA-80), which was assigned to this period on the basis of Sloan and Schwartz's (1960:12) report of a serrated triangular point (Fort Ancient type?) from the site. Assignment of three sites (MACA-30, MACA-37, and MACA-137) to the Early Mississippian period has also been made based primarily on the presence of shell-tempered cordmarked and/or shell-tempered check stamped pottery. This assignment is based on the general consensus that these types of shell-tempered wares are most common during the early portion of this time period.

The Mississippian period is usually characterized as the time in eastern American prehistory during which native cultures reached their greatest complexity (Griffin 1967, 1983; Jennings 1974; Muller 1983; Peebles and Kus 1977; Smith 1986, Smith, ed. 1978). This complexity is reflected in a hierarchy

of site types ranging from single family habitations or "farmsteads" to multi-mound ceremonial centers, a stratified social/political organization that has been broadly compared to chiefdom level societies, specialization in the production of various traded commodities (shell, copper, salt, etc.), and a heavy reliance on maize (corn) horticulture for subsistence. Hunting, fishing, and collecting nuts continued to be the primary ways of providing the most significant portions in the remainder of the diet.

Technological and stylistic changes in the material culture are the most visible indicators of the shift from Woodland to Mississippian at archaeological sites. These included the adoption of shell as a tempering agent in the manufacture of pottery, the introduction of new vessel forms (salt pans, plates, "cazuella type" jars, and water bottles), and the use of wall trench house construction. The use of stone and shell hoes for tilling gardens also proliferated during this period.

The presence of shell-tempered ceramics is typically the means by which Mississippian sites have been identified in the Park (Beditz 1981; Carstens 1980; Prentice 1990b). The most common shell-tempered Mississippian pottery type found in the area is Mississippi Plain. Formerly, this type was called Neeley's Ferry Plain. Shell-tempered Bell Plain ceramics are also recurrent in the area, but not nearly as frequently as the more coarsely tempered and less well smoothed Mississippi Plain (Prentice 1990b). Both ceramic types occur throughout the Mississippian period, making assignment of sites to

Early, Middle, and Late Mississippian classifications difficult when only a few sherds are present at most Mississippian sites in the Park. It is possible to assign some Mississippian sites to an Early Mississippian category based on the occurrence of two "early" shell-tempered ceramic types, McKee Island Cord Marked and Wolf Creek Check Stamped. These ceramic types have been found in low numbers at the Dry Creek site (MACA-137), which is radiocarbon dated around A.D. 1000 (Prentice 1990a), and from Horizon II at Blue Spring Hollow Rockshelter (MACA-37), radiocarbon dated around A.D. 1100 (Carstens 1980). These ceramics also appear to be relatively early in the Mississippian ceramic assemblage at the Jewell site (Hanson 1970), although a long occupation of the site has caused some mixing of the archaeological assemblages.

The adoption of an economic system with a heavy emphasis on maize horticulture for food production greatly determined the settlement patterning of the Mississippian way of life. The majority of Mississippian sites were located along the fertile river bottoms of the Mississippi River and its major tributaries where highly fertile, light soils conducive to hoe tilling methods made maize horticulture most productive. The availability of hickory nuts, fish, deer, and other animal resources also affected site settlement patterns and the degree to which these resources were exploited by the Mississippian peoples (Smith 1978).

The hierarchy and number of Mississippian sites in the Mammoth Cave area never matched the development of Mississippian cultures in the areas

around it, apparently due to the lack of extensive bottomland soils along this portion of the Green River. Instead, the Mississippian presence near Mammoth Cave appears to have consisted mainly of scattered, single family residences located on natural levees on the narrow Green River floodplain or on the level ridge tops overlooking the Green River. On the floodplain, they planted their gardens of maize and other domesticated plants; in the uplands they gathered nuts and hunted deer, turkey, raccoon, and other small animals. Periodically, particularly during the fall and winter, small groups would occupy rockshelters for short periods where they could exploit the nearby upland nut and animal resources.

The political and social organization of the Mississippian peoples that inhabited the Mammoth Cave area has yet to be determined, but there is nothing to suggest that it was in any way as highly organized as many Mississippian groups were elsewhere. Large ceremonial mound centers are locally absent, the nearest recorded one in the Green River drainage being the Annis Village complex located approximately 60 km down river from Mammoth Cave in nearby Butler county. Located in the Big Bend area of the Green River where the floodplain is significantly wider, the Annis Village complex consisted of a stockaded village and two mounds (Lewis 1988, 1990). The mounds and village were excavated by WPA crews around 1940. Unfortunately, the bulk of the material gathered from the site complex has never been analyzed, the exception being Annis Mound. This platform mound

was the object of Jon Young's (1962) master's thesis research, which revealed it to be the result of two stages of construction, each of which was topped by one or more specialized structures. Based on the ceramic assemblage, Lewis (1988:31) has suggested that the site was occupied from roughly A.D. 900 to 1300.

It is likely that the people who occupied the Mississippian period sites in Mammoth Cave National Park were affiliated with the people who lived at Annis Village with communication between the Big Bend and Mammoth Cave areas maintained by way of the Green River. Unfortunately, archaeological research between the two areas is generally lacking, and the research that has been accomplished in both areas is not sufficient to fully evaluate this possibility. Mississippian ceramics found at Annis Mound, for example, are generally comparable to those found at Mississippian sites in the Park, except for the occurrence of the salt pan types, Kimmswick Plain and Kimmswick Fabric Impressed. These two pottery types form an appreciable part (7.6%) of the Mississippian Annis Mound assemblage (Lewis 1988:32), but they have not been collected from sites in the Park. It is possible that the absence of these pottery types in the Park reflects their specialized use in the production of salt, and that this was not generally pursued at the small farmsteads or rockshelters. Other pottery types reported from Annis Mound that are likewise missing from the Park's assemblages are Matthews Incised and O'Byam Incised. Again, these are possibly special function wares associated

with tasks not performed at purely domestic sites. The probability remains, therefore, that the dissimilarities noted between ceramic assemblages at Annis Village and the sites in the Park are reflections of different tasks performed at these sites and not differences in culture.

The Protohistoric Period (A.D. 1500-1700)

The Protohistoric period, dates from A.D. 1500-1700, and, in the case of the upper Green River valley, represents more of a theoretical construct than a characterization based on archaeologically-gathered data. It is during this period that the Old World countries of England, France, Spain, Portugal and Holland began colonizing and vying for possession of the Americas. During much of this period, the native inhabitants of Kentucky may not have had much direct contact with Europeans, but they were surely affected by the dislocation of peoples caused by the European intrusion, the trade of European goods, and the introduction of European diseases. This period, if it can be detected archaeologically in the Green River area, will probably represent a basically Mississippian existence with the addition of a few European goods at some sites.

Direct but ephemeral contact between European explorers and the Indians in Kentucky may have occurred as early as 1673. It was during this year that Marquette and Joliet passed along the western margin of Kentucky as they traveled south from the Illinois country along the Mississippi River. Nine years later, LaSalle and Tonty also passed by Kentucky on their way to

the Gulf of Mexico and the mouth of the Mississippi River. Although the exploration of the French along the Mississippi River did not bring Europeans and inhabitants along the Green River in direct contact, their passage may have had some effect. These European intrusions may have introduced European diseases among Indian groups along the Mississippi and Ohio Rivers, who in turn may have transmitted the diseases inland (Milner 1980; M. Smith 1987). The spread of European diseases and the simultaneous warfare between Indian groups allied with the French and British may have been the reason why much of Kentucky was unoccupied by the time the first European explorers arrived (McBride and McBride 1990:584; Webb 1939:167).

Unspecified Prehistoric Sites

A total of 116 sites (52% of all prehistoric sites) could not be assigned to a temporal category other than "prehistoric" because they lacked artifacts assignable to specific time periods (Figure 11; Table 8). Of these sites, six are isolated finds (excluded from the following percentage calculations), 33 are upland lithic scatters (30%), four are bottomland lithic scatters (4%), five are chert extraction sites or quarries (5%), and 68 are rockshelter/caves (62%).

Rockshelter Sites

Rockshelters sites are the most easily identifiable and numerous variety of site currently listed in the Park (Figure 12). Rockshelters primarily occur where natural overhangs have formed along the exposed portions of the Big

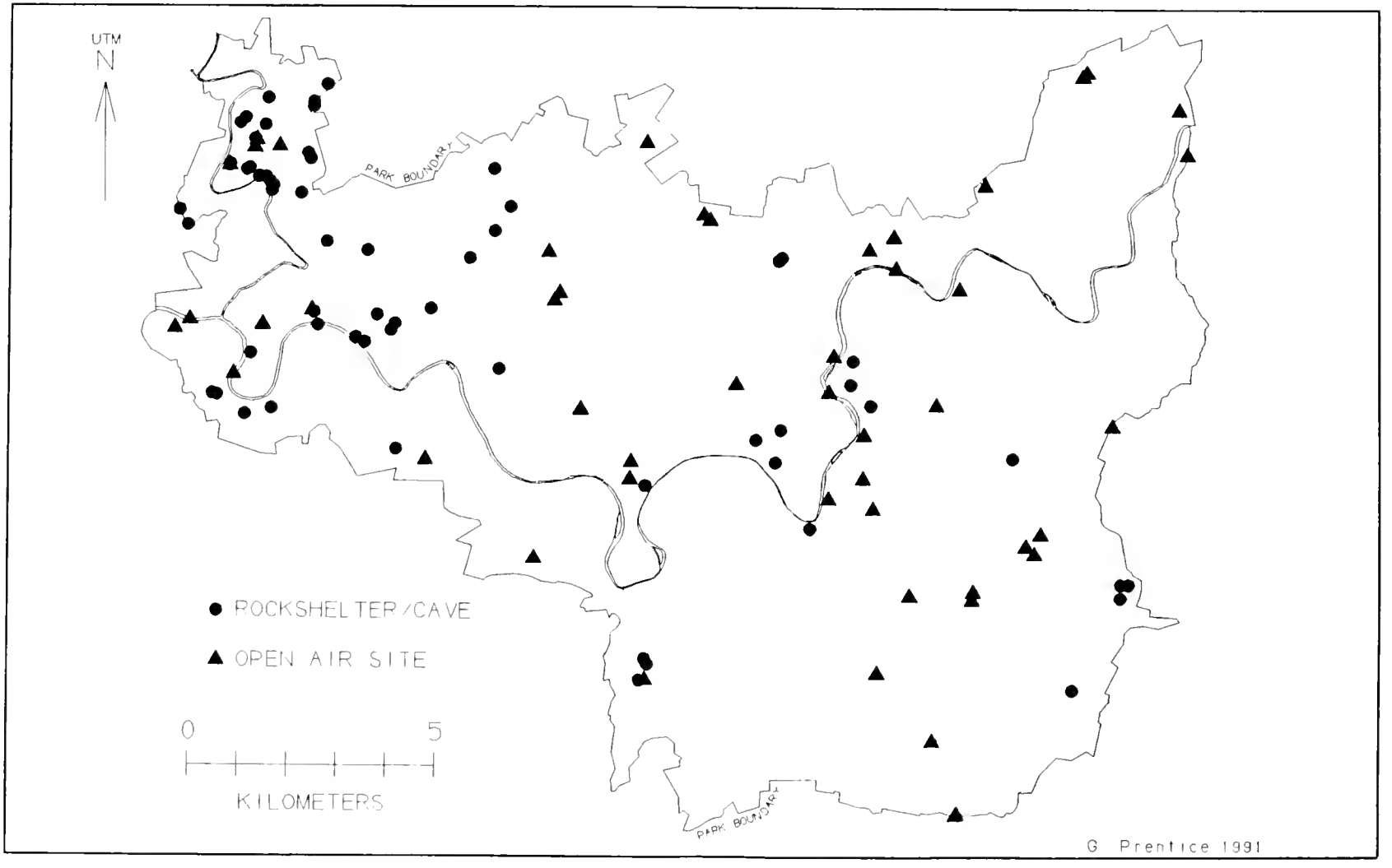

Figure 11. Unspecified Prehistoric Sites in Mammoth Cave National Park.

Table 8. Unspecified Prehistoric Sites in MCNP.

ISOLATED FINDS

MACA-124, MACA-142, MACA-150, MACA-151, MACA-214, MACA-936

UPLAND SCATTERS

MACA-26, MACA-51, MACA-53, MACA-55, MACA-60, MACA-76, MACA-87, MACA-92, MACA-123, MACA-125, MACA-126, MACA-128, MACA-129, MACA-134, MACA-136, MACA-138, MACA-139, MACA-213, MACA-220, MACA-221, MACA-222, MACA-225, MACA-233, MACA-234, MACA-235, MACA-236, MACA-238, MACA-248, MACA-886, MACA-887, MACA-995, MACA-996, MACA-999

BOTTOMLAND SCATTERS

MACA-104, MACA-132, MACA-224, MACA-237

CHERT EXTRACTION SITES

MACA-127, MACA-217, MACA-218, MACA-226, MACA-881

ROCKSHELTER/CAVES

MACA-3, MACA-4, MACA-5, MACA-8, MACA-11, MACA-12, MACA-14, MACA-16, MACA-19, MACA-20, MACA-21, MACA-22, MACA-25, MACA-29, MACA-33, MACA-39, MACA-41, MACA-42, MACA-48, MACA-49, MACA-50, MACA-54, MACA-58, MACA-61, MACA-69, MACA-71, MACA-79, MACA-81, MACA-90, MACA-98, MACA-99, MACA-102, MACA-116, MACA-157, MACA-161, MACA-174, MACA-180, MACA-187, MACA-190, MACA-191, MACA-192, MACA-193, MACA-194, MACA-195, MACA-196, MACA-198, MACA-200, MACA-208, MACA-209, MACA-210, MACA-211, MACA-223, MACA-229, MACA-230, MACA-231, MACA-240, MACA-244, MACA-866, MACA-867, MACA-869, MACA-873, MACA-874, MACA-879, MACA-880, MACA-884, MACA-885, MACA-888, MACA-937.

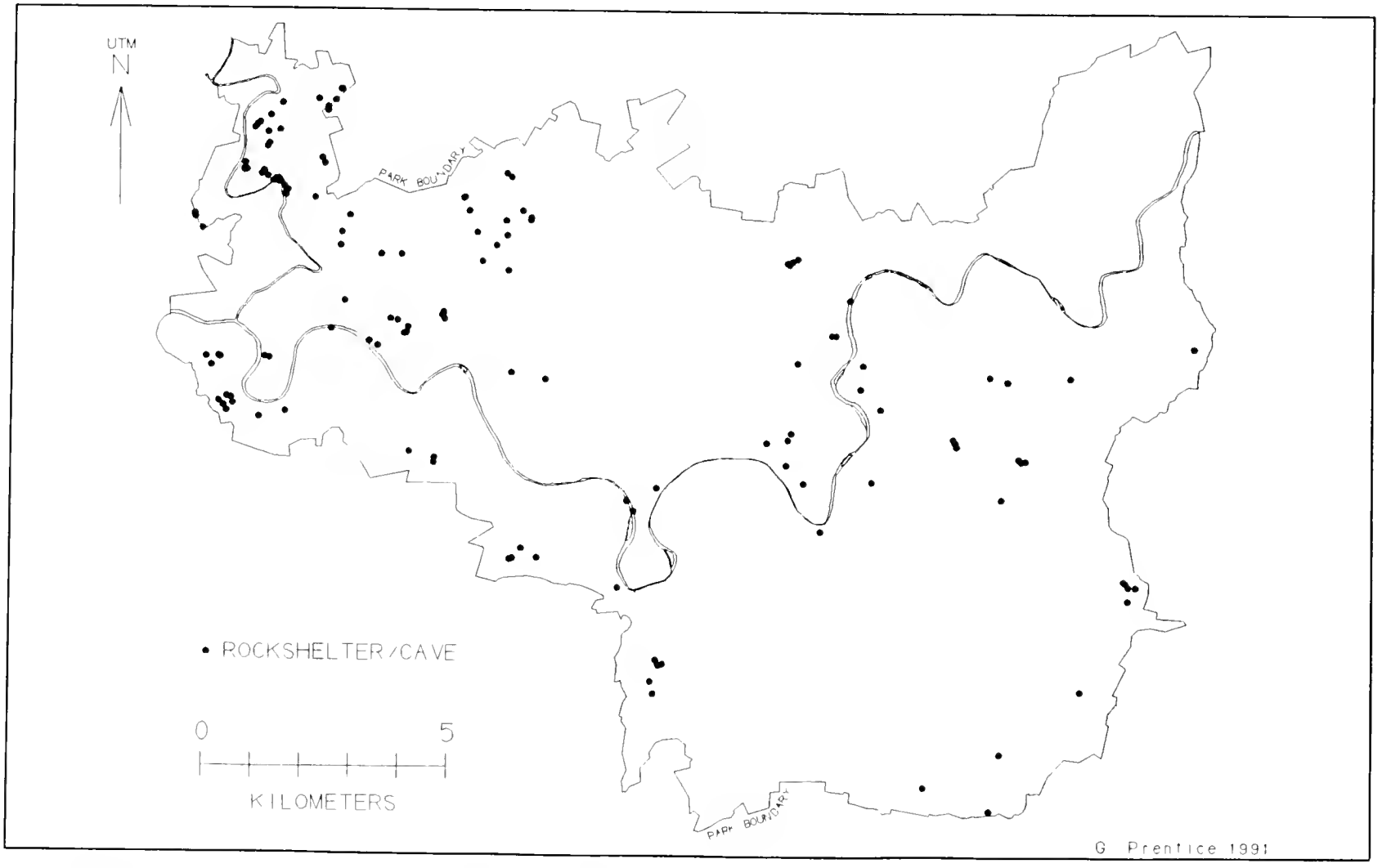

Figure 12. Rockshelter Sites in Mammoth Cave National Park.

Clifty sandstone formation, and, in the northwest portion of the Park, occur in the Caseyville sandstone formation. Overhangs principally occur where the average ground slope exceeds five degrees, in other words, along blufflines, and where ground contours make sharp bends or turns. Large overhangs occur with greatest frequency at the heads of hollows.

Within the 30 bluffline units that were surveyed during the MCNPAIP, a total of 418 overhangs and 34 caves were recorded. During the bluffline surveys, any portion of the bluffline where a person could comfortably sit and get out of the rain was classified as an overhang. Caves consisted of any vertical or horizontal subterranean passage in the bedrock. Whenever an overhang or cave was located, data were collected regarding the type of bedrock, location, approximate dimensions, direction of exposure, and floor conditions. Visual inspection for artifacts or other evidence of human activity was conducted, but no subsurface testing was performed.

Fifty one (12%) of the overhangs recorded within the bluffline survey areas contained evidence of prehistoric occupation. Evaluation of the survey data collected at all overhangs both occupied and unoccupied within the sampled areas indicates that rockshelter site selection was not random.

The hypothesis that overhang size was a factor affecting site selection was measured by first estimating floor areas for all overhangs using the formula, floor area = 1/2(length x width), then grouping the 418 overhangs into 14 size classes developed on the basis of data gathered during this project. The

first ten overhang classes were grouped on the basis of successively increasing increments of 10 m^2. Class 1 overhangs had estimated floor areas of less than 10.00 m^2, Class 2 overhangs had floor areas between 10.00 and 20.00 m^2, Class 3 overhangs had floor areas of 20.00 to 29.99 m^2, etc. The next three classes increased in increments of 100 m^2 (e.g., Class 11 = 100.00-199.99, Class 12 = 200.00-299.99, and Class 13 = 300-399.99 m^2) with all overhangs with formulated areas greater than 400 m^2 assigned to Class 14.

Plotting the distribution of all overhang classes by percentage (Figure 13a), produced a reversed "J" curve indicative of fewer numbers of overhangs in each of the successively larger class sizes, as one would expect. This is the "natural" universe from which the prehistoric inhabitants of the area selected their rockshelter sites. If their selection of overhangs for occupation was random, one would expect a similar reversed "J" curve to result when occupied overhangs are similarly plotted. Instead, we find a bimodal distribution (Figure 13b) indicating a selection for overhangs in the 10 to 50 m^2 range (Figure 14) and in the 100+ m^2 range (Figure 15).

When one looks at the numbers and types of artifacts collected from the occupied overhangs according to class size (Table 9), one is led to the conclusion that large overhangs were preferred site locations and were occupied more frequently and for longer durations than the smaller overhangs. Typically, large rockshelters are multicomponent with a large range of artifact types including projectile points, hoes, hammerstones, scrapers, cores, blades,

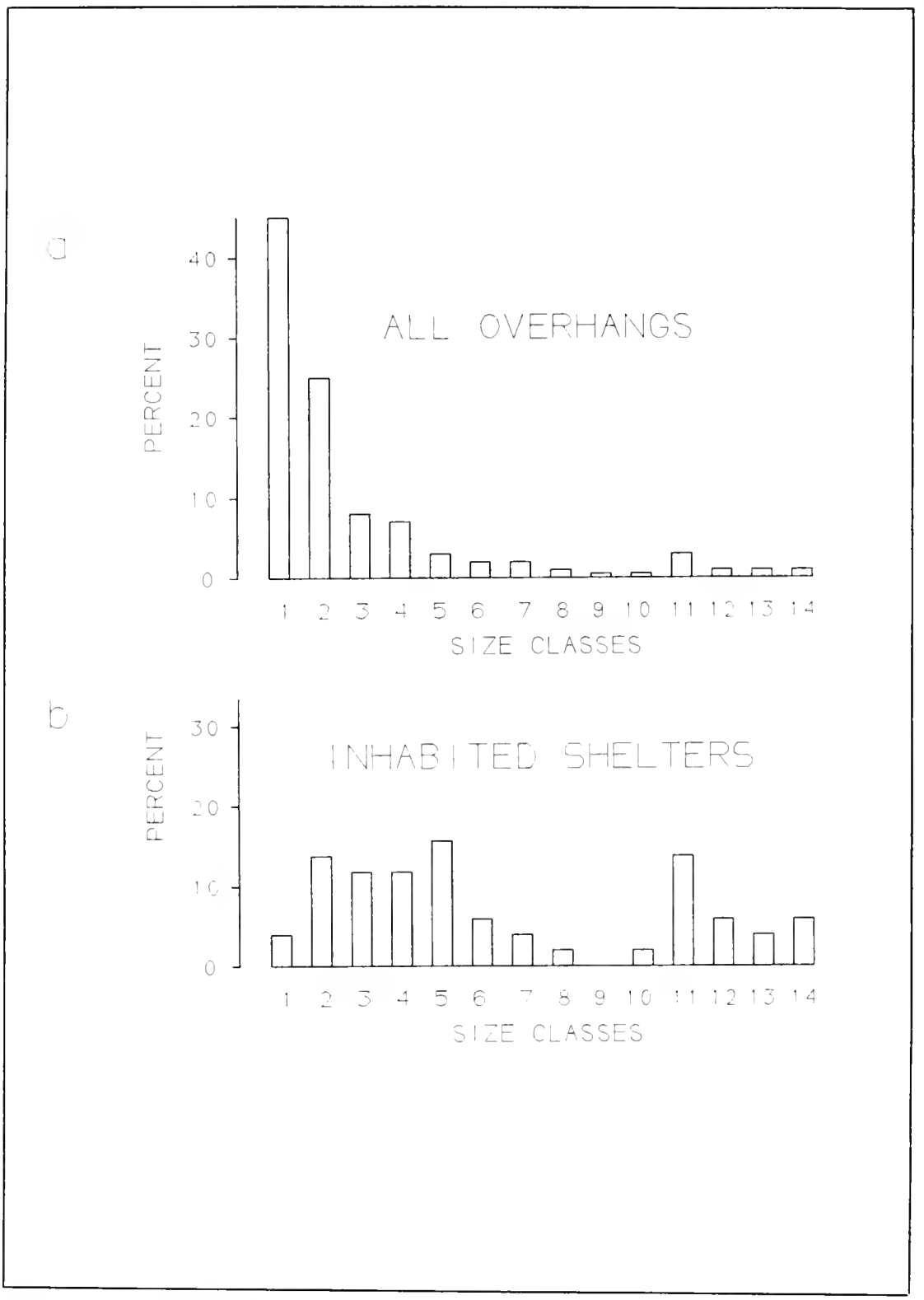

Figure 13. Distributions of overhangs and inhabited rockshelters by size class.

Figure 14. A Typical Small Rockshelter Site in Mammoth Cave National Park.

Figure 15. A Typical Large Rockshelter Site in Mammoth Cave National Park.

Table 9. Some Attributes of the Prehistoric Rockshelters Located during the MCNPAIP Bluffline Survey.

SIZE CLASS	SITE #	# OF KNOWN COMPONENTS	POTTERY PRESENT	HOMINY HOLE PRESENT	# OF ARTIFACT TYPES OBSERVED ON SURFACE	VANDALISM OR LOOTING
1	157	1	NO	NO	1	NO
1	178	1	NO	NO	1	NO
		MEAN = 1			MEAN = 1	NO
2	164	3 *	YES	NO	1	NO
2	187	1	NO	NO	1	NO
2	191	1	NO	NO	1	NO
2	198	1	NO	NO	1	NO
2	200	1	NO	NO	2	NO
2	209	1	NO	NO	2	NO
2	869	1	NO	NO	1	NO
		MEAN = 1.3			MEAN = 1.3	
3	100	1	NO	NO	3	NO
3	168	4 *	YES	NO	7	NO
3	180	1	NO	NO	2	NO
3	190	1	NO	NO	3	NO
3	210	1	NO	NO	3	NO
3	868	1	NO	NO	2	NO
		MEAN = 1.5			MEAN = 3.3	
4	102	1	NO	NO	3	NO
4	174	1	NO	NO	1	NO
4	186	1	NO	NO	4	NO
4	196	1	NO	NO	1	NO
4	208	1	NO	NO	2	NO
4	211	1	NO	NO	1	NO
		MEAN = 1.0			MEAN = 2.2	
5	99	1	NO	NO	2	NO
5	155	2	NO	NO	5	YES
5	166	2	NO	NO	2	YES
5	167	1	NO	NO	3	NO
5	184	1	NO	NO	5	NO
5	194	1	NO	NO	1	NO
5	199	1	NO	NO	2	NO
5	207	1	NO	NO	2	NO
		MEAN = 1.3			MEAN = 2.8	
6	95	4	YES	NO	9	NO
6	101	3	YES	NO	3	YES
6	172	1 *	NO	NO	2	YES
		MEAN = 2.7			MEAN = 4.7	
7	192	1	NO	NO	6	YES
7	195	1	NO	NO	2	NO
		MEAN = 1.0			MEAN = 4.0	
8	870	1	NO	NO	2	NO
		MEAN = 1.0			MEAN = 2.0	

Table 9. Continued.

SIZE CLASS	SITE #	# OF KNOWN COMPONENTS	POTTERY PRESENT	HOMINY HOLE PRESENT	# OF ARTIFACT TYPES OBSERVED ON SURFACE	VANDALISM OR LOOTING
10	98	1 MEAN = 1.0	NO	NO	4 MEAN = 4.0	YES
11	43	3 *	YES	NO	4	NO
11	54	1	NO	YES	3	NO
11	171	5 *	YES	NO	9	YES
11	189	4	YES	NO	10	NO
11	202	1	NO	NO	3	YES
11	204	1	NO	NO	3	YES
11	871	1	NO	NO	1	NO
		MEAN = 2.3			MEAN = 4.7	
12	97	3	NO	NO	3	YES
12	197	1	NO	NO	5	NO
12	867	1	NO	YES	1	YES
		MEAN = 1.7			MEAN = 3.0	
13	25	1	NO	NO	1	NO
13	206	1*	YES	NO	5	YES
		MEAN = 1.0			MEAN = 3.0	
14	24	2	YES	NO	5	YES
14	44	4 *	YES	YES	5	YES
14	866	1	NO	YES	5	YES
		MEAN = 2.3			MEAN = 5.0	

* Number of Components based on Test Excavations

pottery, and grinding stones such as metates and hominy holes. Excavations at these large rockshelters commonly uncover storage pits and significant quantities of charred nutshell, wood, and other floral materials, deer and other animal bone, mussels, chert debris, and human burials. All of these pieces of evidence point towards relatively long occupations by sizeable social groups, probably extended family units. Activities included hunting, mussel collecting, nut harvesting, food storage and processing, and lithic tool production.

In contrast, small rockshelters typically exhibit little more than a few scattered chert flakes, an occasional projectile point or two, and maybe a pottery vessel fragment. Often when diagnostic artifacts are recovered, they can be assigned to a single time period. There are, of course, smaller rockshelters that evidence multiple occupations, but these are in the minority and usually exhibit only a couple of occupations, often greatly separated in time. Excavations conducted at these sites, have in the main, produced no subsurface features such as pits and scant floral and faunal remains. It is probably safe to say that small rockshelter sites represent short term occupations by a relatively few individuals while performing specific tasks. The high frequency of broken and whole projectile points at these sites would suggest that small hunting parties were the principal users of these sites.

Size alone does not, however, predict whether or not an overhang was occupied. Of the 24 largest overhangs within the bluffline survey areas, 16 (67%) were occupied. Of the eight remaining large overhangs that did not

exhibit prehistoric occupations, six had very wet floor conditions, and one was located in the middle of a steep bluff, making access to it very difficult. Habitability and accessibility were, it would seem, factors that led potential occupants to reject some large overhangs as habitation sites.

Evaluation of such single factors as direction of exposure, rocky surface conditions, and accessibility have not shown any significant selection for or against shelter-use based on these factors alone although there appears to be a slight preference toward southern and western exposures (Figure 16).

Open-air Sites

The MCNPAIP has identified five major kinds of prehistoric open-air occupation sites: large multicomponent upland scatters on the ridge tops adjacent to the Green River (Figure 17); small prehistoric upland scatters away from the Green River usually near small tributary confluences and springs (Figure 17); large bottomland sites located near the confluences of major streams with the Green River (Figure 18); small prehistoric bottomland sites on the natural levees and elevated portions of the floodplain (Figure 18); and prehistoric lithic scatters surrounding the few natural ponds that occur on the upland ridges south of the Green River (Figure 17). A sixth type of open-air site, chert extraction sites, has also been identified during the survey (Figure 17). These specialized sites occur in the upland valleys south of the Green River along gentle slopes at elevations of roughly 335 m (700 ft) above mean sea level. These areas represent locations where weathered surficial Ste.

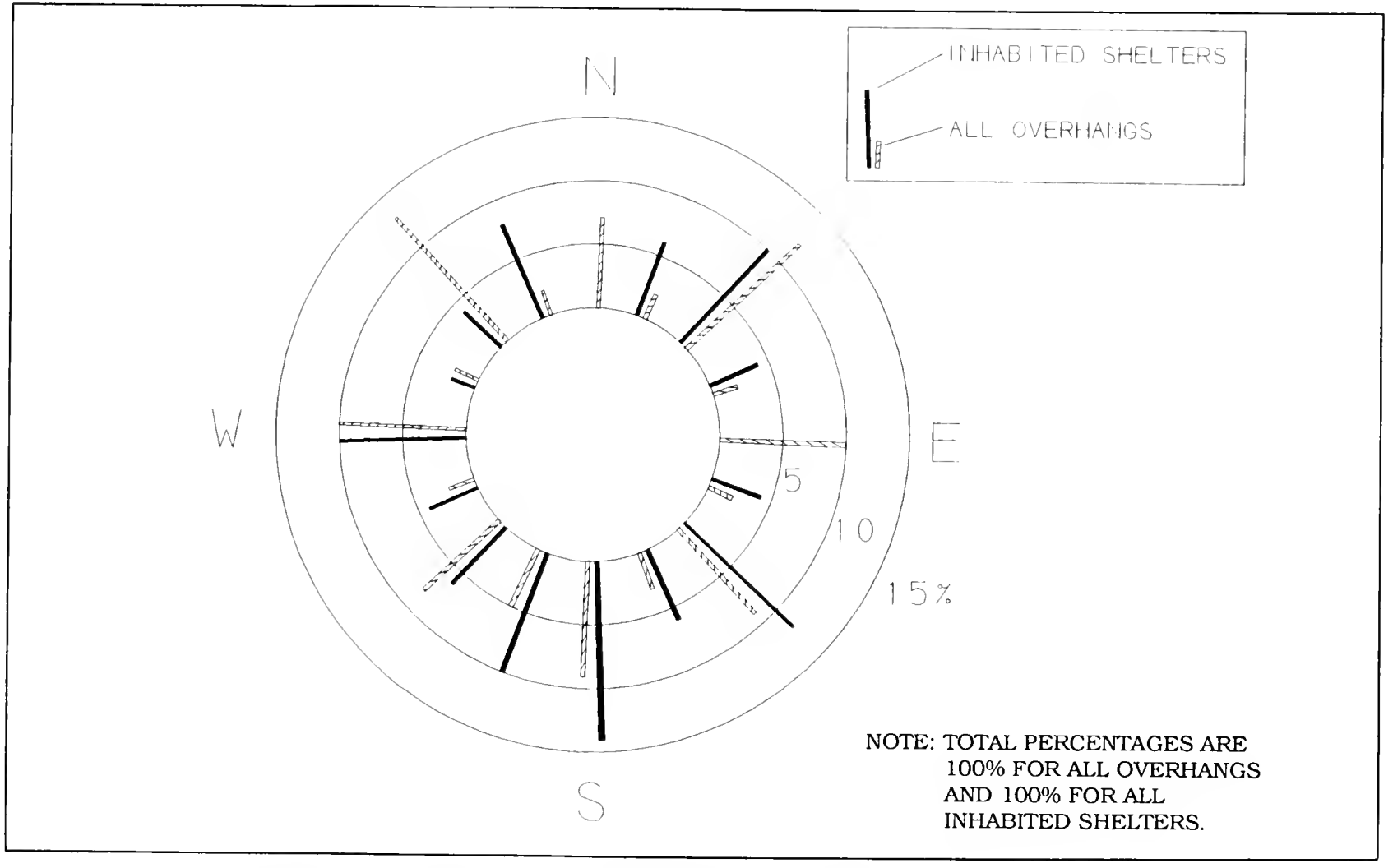

Figure 16. Distributions of Overhangs and Rockshelters by Direction of Exposure.

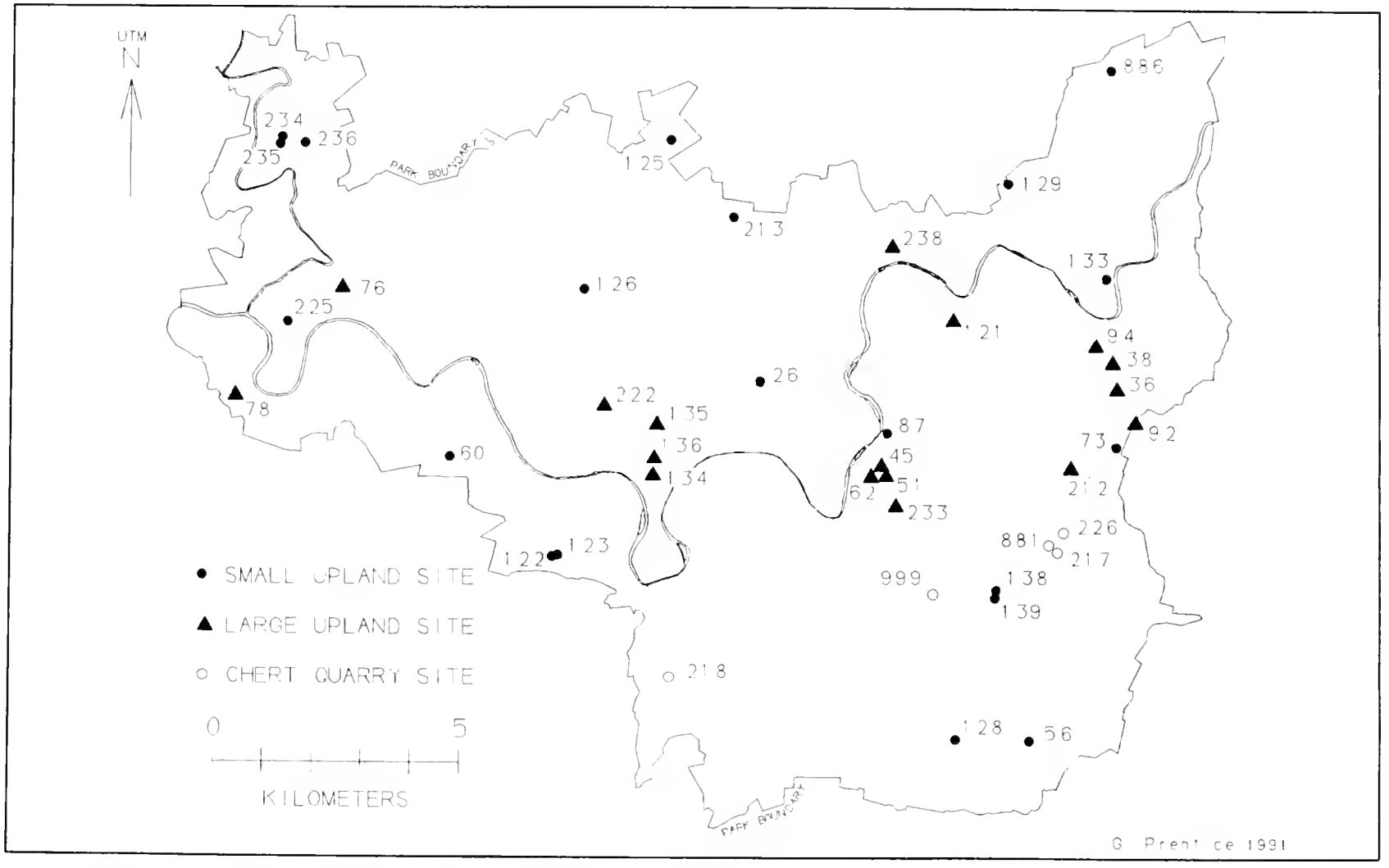

Figure 17. Large and Small Upland Sites in the Park.

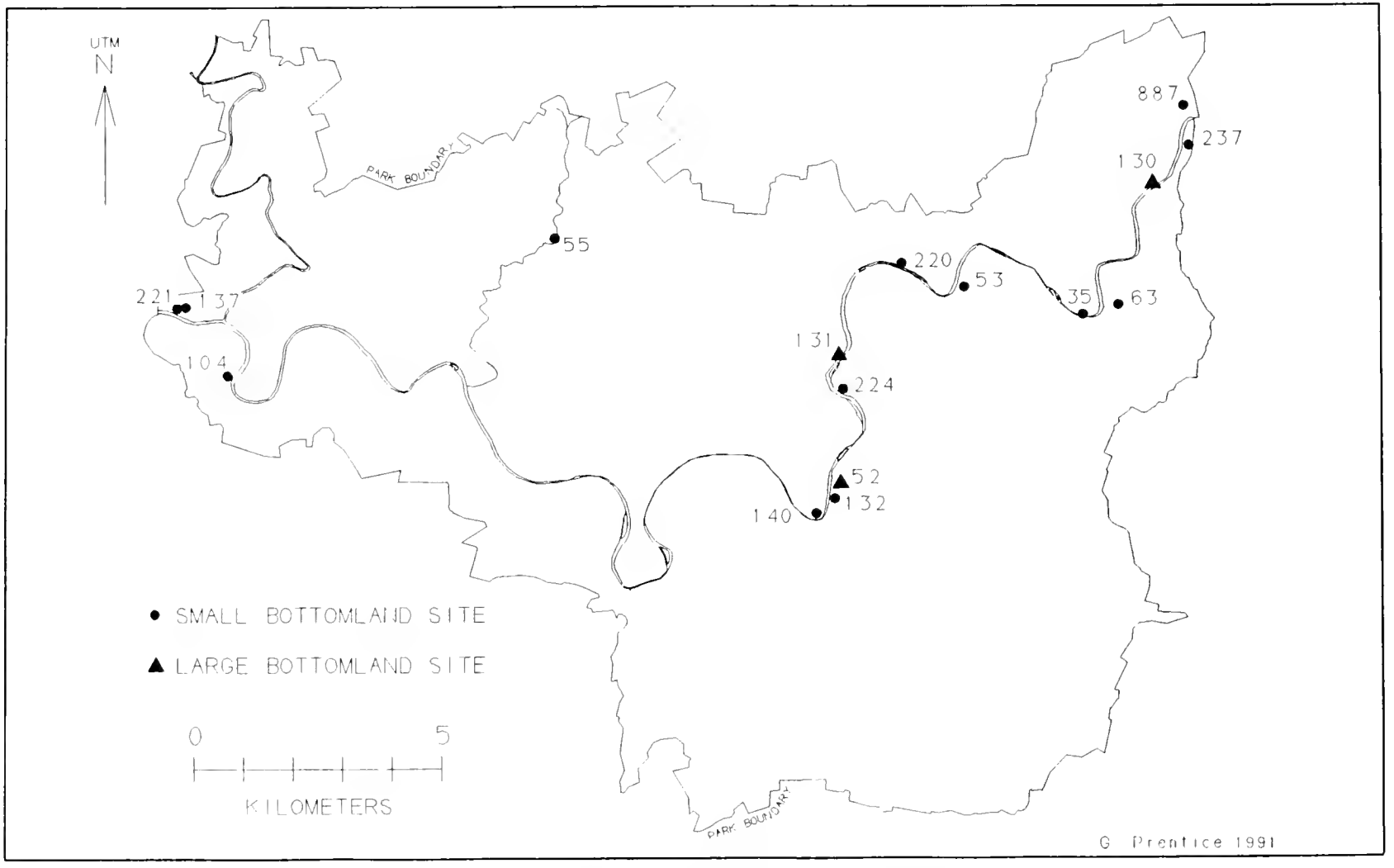

Figure 18. Large and Small Bottomland Sites in Mammoth Cave National Park.

Genevieve and Girkin limestone formations have deposited chert nodules in abundant numbers. Raw chert is also available for easy exploitation along the blufflines of the Green River, especially in the larger hollows, where the Ste. Genevieve limestone is exposed. Some of the larger open-air bottomland sites located near the larger hollows, such as MACA-131, may have been used as chert extraction localities.

The rockshelter site, MACA-102, although classified as a rockshelter, may also have been a chert extraction site. Chert nodules are present in the bed of the stream that flows through this limestone rockshelter/cave site. Waterworn nodules of chert, referred to as "floaters" (Arthur N. Palmer, personal communication 1987), can also be recovered from among the gravel beds of the Green River. The recovery of numerous water worn chert cores from prehistoric sites in the Park (Manzano 1990) attests to the prehistoric utilization of this chert source.

Like the dual division of rockshelters into large and small, a division of open-air sites into large and small seems equally appropriate. The large upland sites consist of multi-component artifact scatters located on the large ridge tops immediately adjacent to the Green River in areas where access to the river bottoms is relatively easy. Examples of these type of sites are MACA-121, MACA-135, and MACA-136. The upland sites MACA-36, MACA-38, and MACA-94 are probably parts of one large upland scatter covering the whole ridge. Likewise, MACA-45, MACA-51, and MACA-62 are probably parts of a

large continuous upland scatter surrounding Mammoth Cave (MACA-215). The large hollows that border the Green River apparently provided the most commonly used avenues of easy access between the bottoms and the uplands. One large upland site that diverges from this pattern is MACA-212 which is located almost three km from the Green River on the ridge adjacent to Adwell Springs. The availability of this perennial water source no doubt influenced the selection of this ridge as a place of repeated occupations.

Periods of known occupation span the Early Archaic through the Mississippian at the large upland sites, but excavations at these sites have failed to produce any subsurface features. At this point in time, it can only be hypothesized that the prehistoric occupations that produced these sites were generally ephemeral in nature and that the primary purpose for settling in these locations was to take advantage of the resources offered by the oak-hickory forests there.

The small upland sites contrast with the large upland sites not only in size but in location. The small upland sites are typically located away from the Green River, usually near seasonal streams, springs, and ponds, in areas where access to the Green River is more difficult. Examples of these types of sites are MACA-122, MACA-123, MACA-125, MACA-126, and MACA-886. These sites often consist of little more than small lithic scatters, and excavations at these sites have also failed to produce any subsurface features. Like their larger-sized cousins, these sites appear to be of short duration, but

unlike the larger sites were not the places of repeated occupations through time.

The large and small upland sites have their counterparts in the bottomlands. The large bottomland sites are located near the confluences of major streams with the Green River where there is easy access to the uplands and sizeable floodplain areas for occupation. Examples of these types of sites are MACA-52, MACA-130, and MACA-131. Smaller bottomland sites are typically further removed from the major streams on small natural levees and ridges. Examples of these smaller sites are MACA-132, MACA-140, and MACA-137. Like their upland counterparts, the differences between the two bottomland site types appears to be mainly of repeated occupation at the large sites, versus infrequent occupations of the smaller site locations. In both the large upland and large bottomland site types, easy access to the adjacent upland and bottomland zones and the Green River appear to have been primary factors influencing site location. Such a settlement pattern allowed the site inhabitants access to multiple resource zones (river, floodplain, bluffs, and uplands) with a minimum of travel time and effort.

The fifth type of open-air occupation site to occur in the Park, consist of lithic scatters surrounding natural ponds on the upland ridges of the Plateau. Examples of this type of site are MACA-128 and MACA-996. In this area of the Park, surface water is generally lacking because of the karst geologic conditions, so the relatively few ponds that did occur acted as focal points for

human groups exploiting the local areas. Unfortunately, no excavations have been conducted at these types of sites, so they can only be characterized on the basis of shovel test results. Artifactually, they don't appear to differ significantly from other upland lithic scatters, and are probably the results of the same sorts of activities that were pursued at the other large and small upland open-air sites: hunting and nut harvesting.

Summary Observations

Archaeological data collected from the rockshelter sites provide the most complete picture currently available for the various non-cave site types that occur in the Park. The bulk of the evidence collected from rockshelters indicate that they are of two basic types: (1) large rockshelters occupied for extended periods of time during which pits were utilized for storage, greater varieties of tools were used and deposited along with plant and animal refuse, and the dead were interred, and (2) small rockshelters that were occupied for shorter amounts of time and thus lack many of the cultural attributes of the larger rockshelters. Assuming that the archaeological assemblages are true reflections of the range of activities pursued at each site and that shelter size generally correlates with the size of the inhabiting groups, there is reasonable evidence to conclude that rockshelters were primarily fall/winter occupations with large shelters occupied by single, perhaps extended, families or small bands, while small shelters were more often occupied by small hunting parties.

Despite the lack of adequate subsistence data from undisturbed archaeological contexts from the upland open-air sites, there is enough evidence to conclude that fall hunting and nut harvesting were the primary activities pursued there. Firstly, there are the vegetational and pedological characteristics of the uplands. Dominated by oak/hickory forests, the uplands provide the primary source of the valuable acorn and hickory nut resources. Oaks and hickories occur in significantly lower numbers in the bluffline and floodplain areas, so nut harvesting (and presumably site occupation) during the fall would have occurred extensively in the upland and immediately adjacent bluffline areas. The upland areas are also generally poorly suited for agricultural purposes. Generally lacking in nutrients, the soils in the majority of these topographic situations also erode easily. Extensive soil erosion associated with farming was a significant problem encountered by the original Park developers in the 1930s, and large erosional gullies still scar much of the upland areas. Secondly, "nutting stones" or stone mortars/metates have been recovered from at least one of the large upland sites (MACA-121), and would appear to support the hypothesis of nut harvesting being a major activity at these kinds of sites. And thirdly, there are enough ethnohistoric examples of eastern Native American subsistence practices (Reidhead 1981; Smith 1975; Swanton 1946) to conclude that, in all probability, hunting, especially for deer and turkey, would have been a major activity during the period of nut mast availability. This is supported by the frequent occurrence of projectile points

at the large upland sites (Manzano 1989). The absence of subsurface features at the upland sites may simply be a result of inadequate sampling, but currently it is believed that this is indicative of a general overall lesser site permanence than that found in the rockshelters where these features do occur.

The floodplain sites are somewhat more problematical to interpret given the same lack of good subsistence data from the majority of these sites. Only the small Dry Creek site (MACA-137) has been excavated to a point which permits one to conclude that it probably represents an Early Mississippian hamlet or homestead and that its inhabitants raised maize, harvested nuts, fished, and hunted deer and small mammals. At face value, these would appear to indicate a summer and fall occupation of the site. The possibility that it was occupied year round is currently not appraisable, but given the floodplain location it is unlikely that it was occupied during the spring.

The floodplain is a hazardous place to live at certain times of the year, particularly spring. Flooding of the entire floodplain in this portion of the Park, despite water control measures (i.e., dams), is a nearly annual occurrence. Studies of the modern flood patterns in the Mammoth Cave area (National Park Service 1991:21) show that water levels reach approximately 139 m (456 ft), or 10.6 m (35 ft) above normal pool level (421 ft) at approximately two year intervals. Given the frequency of flooding in the spring, it is unlikely that extended occupations would have occurred there during this time of the year.

Given the seasonal flooding pattern along this portion of the Green River, it seems reasonable to conclude that sites on the floodplain would have been largely vacated during the period of heavy spring rains. It appears logical to infer, therefore, that if there were occupations in the Park area during the spring, they would have been situated at higher elevations where flooding of the river would not have posed a problem. In these cases the sites would probably have been located near the floodplain in order to take advantage of the amaranth, chenopod and other greens that would have become available for exploitation at this time of the year. Some of the rockshelters located along the blufflines adjoining the Green and Nolin rivers may have functioned in this fashion as would the large upland sites immediately adjacent to the floodplain. Currently, however, there is no direct evidence to support spring occupations of these kinds of sites.

When open-air sites do occur on the floodplain, they generally appear on small natural levees or on the large alluvial/colluvial fans associated with major tributaries of the Green and Nolin rivers. These locations reveal a concern with the hydrological factors found on the floodplain, and apparently a preference for those areas providing easier access to the uplands through the tributary hollows. The greater availability of chert resources near the larger hollows may also have been a factor influencing more extensive utilization of these large floodplain sites.

MODELING PREHISTORIC DECISION-MAKING AND SITE SELECTION

Introduction

In my personal attempt to evaluate and reconcile the various theoretical perspectives and methodologies that have evolved within the various subfields of anthropology, I have been encouraged by Ellen's (1982) Marxist approach to cultural ecology. It is, like the present thesis, an attempt to reconcile and synthesize Marxist and formalist theory into a unified paradigm. Like most Marxists, myself included, Ellen argues that to understand a society it is necessary to focus on the primary mode of production practiced by that society, and to examine how other aspects of the social system affect and are affected by the mode of production. But, he argues, it is also necessary for such an approach to be placed within a cultural ecology framework where individuals are the elemental units of behavioral study.

As one might suspect, in the process of integrating Marxist theory with modern cultural ecology, Ellen has relied heavily on ecosystems theory and the principles and concepts developed within that field of natural science, in particular, ideas about energy and material capture, energy and material flows, and their expenditure. He has, of course, adopted the basic Marxist

concepts (means of production, relations of production, etc.), and, as if anticipating Prattis' (1987) advocation of terms like "scheduling" and "situational logic" as part of the reconciling of Marxist and formalist theory, Ellen has utilized Flannery's (1968) term, "scheduling", to refer to decision-making behavior in order to avoid the pitfalls of formalist theory. Ellen has also grounded his approach at the level of material production (the same position previously advocated by Cook [1973] and Hart [1982]), distinguishing his method from the more typical Marxist approaches by referring to material production as "ecological production" to distinguish it from "economic production" which carries the additional connotation of "exchange value."

The result is a form of cultural ecology that attempts to model human economic behavior based on: (1) the basic formalist principle that humans tend to maximize return and minimize effort, but moderated by the view that decision-making occurs within a socio-cultural context and thus reflects social values and tastes, (2) the ecological principle that humans have corporeal bodies that have nutritional and material requirements and thus require energy and material capture and expenditure (i.e., production and consumption), and (3) the basic Marxist principle that the mode of production (the technological base and the way in which the means of production are organized) predominately determines the rest of the economic system (patterns of transference and consumption) and the legal, political, and ideological formations of the social system.

In implementing this approach, Ellen has demonstrated the heuristic advantages of utilizing economic spacial theory, in particular, what is commonly known as "site catchment analysis" (cf. Roper 1979), to model the subsistence strategies of "small-scale", non-western societies using a generalized set of six different generalized subsistence techniques. These subsistence techniques are (1) gathering of vegetable species, (2) collecting of animal species and their products, (3) fishing, (4) hunting and trapping, (5) animal husbandry, and (6) plant cultivation (Ellen 1982:128). The various combinations and proportions in which these techniques are implemented within a society constitutes that society's "mode of subsistence". At a very general level, modes of subsistence can be said to correlate at a basic level with the common ethnographic categories of hunter-gatherer, pastoralist, swidden agriculturalist, etc.

Placed within a cultural ecology framework which attempts to consider all pertinent variables (both socio-cultural and environmental) pertaining to human-ecosystem interactions, Ellen successfully demonstrates the complexity of human-ecosystem interactions, but at the same time demonstrates the advantages of approaches which recognize this complexity and attempt to model human decision-making accordingly. Although Ellen (1982:89, 95) freely admits that it is not currently possible to elucidate all the interactions within any ecosystem, it is possible to describe energy and material flows in generalized terms and to evaluate them quantitatively.

Economic spatial theory expressed in the form of settlement pattern analyses is among those approaches to modeling human-ecosystem interactions which can be described and evaluated quantitatively. As such, it has a long history of use in both geography and anthropology, including cultural ecology and archaeology. Economic spatial theory is based on the assumption that in the long run people minimize cost and maximize returns. Such "least cost" or "mini-max" location theories, for example, underlie Christaller's (1966) "central place theory" model and variations thereof (e.g., Renfrew's [1975:13] Early State Modules), site catchment analysis (Foley 1977; Jarman 1972; Jochim 1976; Roper 1979; Vita-Finzi and Higgs 1970), gravity ("fall off pattern") models (Renfrew 1977; Hodder and Orton 1976), and "functional center models" (Steponaitis 1978; Crumley and Marquardt 1987). The basic "least cost" principle which forms the basis of all these approaches was proposed over 150 years ago by von Thunen (1875) in his now well known model of diminishing returns with distance. In turn, Vita-Finzi and Higgs (1970) used von Thunen's model to develop the now widely copied and more refined catchment area approaches to examining archaeological site resource exploitation (eg., Jarman 1972; Jochim 1976; cf. Roper 1979). In his applications of economic spacial theory, Ellen (1982:160-168) has demonstrated how resource availability and production yield/cost ratios can be modeled using isarithmic site catchment analyses similar to those developed by Foley (1977) to model the productivity contours of paleoenvironments. Similar to the "contour maps" sometimes used

by archaeologists to plot the distributions of artifact densities at sites, productivity contour maps plot the uneven distributions of various resources (foods in particular) across the landscape. Search time, capture effort, transport, and other "costs" of appropriating various resources can be similarly plotted and used in conjunction with productivity contours to model energy capture/energy expenditure and similar return-for-effort ratios as a basis for evaluating mini-max models. Isarithmic maps that portray return-for-effort data have been referred to as "isocal" representations (Ellen 1982:163).

Obviously, the precision with which productivity and work effort contours can be constructed for modern ecosystems, cannot be performed to the same degree for ancient peoples and their environments. Archaeologists are not currently able to perform this level of analysis for individual households because too many variables (waste disposal, processing off site, differential preservation, household population sizes, exchange, length of site occupation, seasonality, droughts, crop yields, animal populations, etc.) cannot be accurately accounted for on a per household basis. It may be possible to heuristically get around these impediments in the future by developing energy expenditure models using average efficiency estimates (energy gained/energy expended) for basic activity sets (appropriation, transport, storage, food processing) involving different means of production (technologies) and different relations of production based on ethnographically derived models. Developed in conjunction with: (1) demographic reconstructions and (2) nutritional health

profiles, (3) better control over seasonality factors, (4) resource cost-benefit models based on multi-scaler catchment areas, and (5) computer simulations of vegetal and animal biomass productivity contours (Foley 1977; Ellen 1982) could provide us with more refined subsistence economy models in the future.

Although it is not currently possible to implement such a sophisticated approach with the current project data, it is possible to evaluate the relationship between biotic resource potential and subsistence choices from a more generalized approach: one that incorporates estimates of potential biotic productivity at a coarser scale and assumes that energy expenditure will be minimized. This is what has been done in the present study as part of the basis of evaluating the hypothesis that site distributions exhibited in the present study area generally conform to the proposition that site selection reflects the decisions made by past peoples to minimize their subsistence efforts while pursuing a particular mode of subsistence. Coupled with the linear programming method to arrive at an optimum solution to the problem of minimizing costs given a wide range of production options and limiting factors, the objective of this and the next chapter will be to evaluate the proposition that the distribution of sites exhibited in the Park has remained relatively constant from the Late Archaic through Mississippian periods because they represent essentially the same decision-making processes: selecting a fall/winter habitation which will minimize effort while providing a socially proscribed and biologically determined level of subsistence. As the

following analyses will demonstrate, fall and winter are the most "productive" seasons of the year for the majority of the catchment areas which encompass each of the sites included in this last phase of the analysis. It is proposed that at other times of the year (spring and summer), the majority of precolumbian peoples who seasonally occupied the Mammoth Cave area migrated downstream to take advantage of the more extensive floodplain and adjacent riverine environments with their greater resource potential during the warm weather months. Those few who stayed behind probably account for the majority of floodplain sites that are known to occur in the vicinity of the Park.

Of the various approaches which can be pursued in site catchment analysis, the approach taken here is probably among the most basic. This has been, in part, the result of a conscious effort to avoid portraying a degree of accuracy within the current study which is greater than truly exists. For example, no attempt has been made to distinguish "mini-", "micro-", and "macro-catchment" areas (Jochim 1976:55; cf. Butzer 1982:231-234) for several reasons. The most important of these is that all evidence suggests that the sites included in the present analysis were probably never occupied for more than a few months at a time, probably by social groups no larger than single extended families, i.e. single households. The topography of the study area for the purposes of site catchment analysis is also divided into only four major categories (upland, bluffline, floodplain, and river). I have not followed Carstens' (1980) apparent assumption that the various microbiomes that

"currently" exist in the Park (Faller 1975) reflect the existence of nearly identical conditions in the past, because I question the applicability of attributing highly specific land/plant distributions obtained from modern land patterns into the remote past, particularly for the topographically dynamic karst areas of the Park.

The decision was also made to use a relatively small site catchment area with a radius of only 2.0 km (1.24 mi), which like all catchment sizes is arbitrary, but in this case is also partly based on the observation that the majority of resources utilized by peoples who rely on walking as the primary mode of transportation and who live in relatively high productivity areas usually obtain most of their daily material needs within a few kilometers of home (e.g., Arnold 1975:192; Butzer 1982:237; Chisholm 1968). As a result, the size of the catchment areas selected should, in theory, reflect something akin to the "supply zone" behavior referred to by Renfrew (1977:84) in which there is no drop-off pattern in resource use within a short distance of the source because travel and transport costs are essentially negligible. This phenomenon has also been referred to as the "plateau effect" (Olsson 1966:17; Crumley 1979:150). Originally intended to describe the transfer of materials only a short distance from their source of origin, the same principle of "equal access" can be said to exist for those resources which may be appropriated within a short distance of a site. In other words, because small catchment areas are the focus of study, all resources within each catchment area should

have essentially equal transport costs; therefore, distance from site to resource should not be a factor that would significantly affect resource selection decisions. This is another reason why the attempt has not been made to distinguish "mini-", "micro-", and "macro-catchment" areas.

A circle with a 2.0 km radius circumscribes an area of approximately 1256 ha, but the use of GRASS in this instance to calculate the area of each topographic zone within a 2.0 km radius of each site results in a total catchment area of 1262.52 ha (3118.4 acres, 4.85 mi^2) as a consequence of using raster data sets and the selected pixel size. This figure, does not, of course, compensate for the fact that not all of the terrain within each catchment area is level. In reality, the actual surface areas of the upland and bluffline zones, particularly the bluffline zones, are undervalued in the surface area calculations performed in GRASS because ground slope is not factored in. Although this, in a sense, somewhat compromises the validity of the calculations which follow, it is not viewed as a major concern in this case, since a planar calculation of topographic zones is used in most other applications of site catchment analyses as well as in the calculation of species availability in different biomes.

As was mentioned at the beginning of the previous chapter, many of the recent ethnographic studies concerned with quantifying household economics have been concerned with the subsistence economy of households where the primary focus is on energy expenditure and energy return in terms of food

production and consumption, and that currently archaeologists are not able to perform a similarly detailed level of analysis for individual sites because too many variables (waste disposal, processing off site, differential preservation, number of households, household population sizes, exchange, length of site occupation, seasonality, droughts, etc.) usually cannot be accurately accounted for on a household by household basis. Since the majority of these "formational processes" cannot be controlled for in the present study, it will be presumed that these factors have not varied greatly from site to site and that the assemblages recovered from these sites have not been significantly biased relative to one another by different formational processes. Until such time when greater control over formational processes is realized, the modest attempt to model resource selection presented here, should demonstrate the utility of an approach which endeavors to model individual decision-making at the household level by adopting the theoretical position that past peoples were rational human beings who generally sought to minimize effort while pursuing a particular mode of production. This proposition will be tested by using linear programming to arrive at a optimal solution for plant and animal resource utilization within a given catchment area which will then be compared to the actual artifact assemblage found at each site to see if the two are similar. Where the linear programming models fail to adequately predict archaeological reality, other "rational" explanations will be sought to account for the apparent contradictions to the model.

Linear Programming

Before proceeding to the presentation and discussion of the modeling of optimal resource utilization at the various sites that have been selected for catchment analysis, a brief discussion of the variables involved in linear programming is in order. Linear programming (LP) is one means of calculating an optimal solution given certain maximal or minimal requirements. The specific form of programming used here is referred to as the "revised simplex method" as it is implemented in the LP procedure included in the SAS Version 6 software package written and distributed by the SAS Institute. The SAS Version 6 programming package permits the use of either a mainframe or a desktop MS/PC-DOS compatible personal computer to reiteratively construct a solution matrix which is then evaluated in terms of the minimum and maximum constraints formulated within the problem. In this case, the programs were run on the mainframe computer system on the University of Florida, Gainesville campus. In the programs executed for the current study, the optimal solution sought was the least amount of labor necessary to arrive at the predefined minimum nutritional requirements for a family of seven over a period of three months (90 days) given the maximum potential yield of the various food resources within each catchment area, the costs associated with appropriating each one, the season(s) of the year in which resources were appropriated, and a particular mode of production.

To arrive at a meaningful answer, a wide array of variables must be included in the linear programming calculations. The present calculations, following the example set by Reidhead (1981) and the obvious necessity of including seasonality factors and storage behavior when modeling subsistence studies (e.g., Ellen 1981; Butzer 1982), were run for each season (spring, summer, fall, and winter) for each site using the topographic zone area estimates obtained by utilizing GRASS (Table 11). The edible plant and animal resource availability values are presented in Tables 12 and 13, the seasonal resource costs in Table 14, and the minimum daily nutrient requirements in Table 15. The specific combination of values that was used for each linear program simulation are presented in Appendix I and are discussed in greater detail later where appropriate.

The minimum individual daily nutritional requirements (i.e., minimal constraints) utilized in the present linear programming models (Table 15) were taken directly from Reidhead (1981). Reidhead used two different sets of minimum dietary requirements, one for winter and one for other seasons, in his linear programming models based on the assumption that some nutrients that can be stored in the body for extended periods could be taken in smaller quantities during the leaner winter months without serious risk to the health of the site occupants. To permit comparability with Reidhead's linear programming results, the same approach has been adopted here.

Table 11. Catchment Area Values for the Sites Selected for Analysis.

SITE	TOPOGRAPHIC ZONE	AREA (ha)
MACA-37	UPLAND	605.750
	BLUFFLINE	656.770
	FLOODPLAIN	0.000
	WATER	0.000
MACA-43	UPLAND	601.190
	BLUFFLINE	519.850
	FLOODPLAIN	107.910
	WATER	33.570
MACA-65	UPLAND	644.900
	BLUFFLINE	617.620
	FLOODPLAIN	0.000
	WATER	0.000
MACA-89	UPLAND	884.300
	BLUFFLINE	378.220
	FLOODPLAIN	0.000
	WATER	0.000
MACA-93	UPLAND	753.400
	BLUFFLINE	480.880
	FLOODPLAIN	26.360
	WATER	1.880
MACA-137	UPLAND	523.075
	BLUFFLINE	544.300
	FLOODPLAIN	144.397
	WATER	50.748
MACA-171	UPLAND	884.200
	BLUFFLINE	321.190
	FLOODPLAIN	50.240
	WATER	6.890
MACA-000	UPLAND	295.850
	BLUFFLINE	812.580
	FLOODPLAIN	154.090
	WATER	0.000

Table 12. Plant Resource Availability Values Used in the Study.

SPECIES	TOPOGRAPHIC ZONE	USEABLE kg/ha
HAWTHORNS	FLOODPLAIN	0.05000
BERRIES (RUBUS SP.)	FLOODPLAIN	0.05000
BLACK CHERRY	FLOODPLAIN	50.00000
GRAPES	FLOODPLAIN	0.64230
ELDERBERRIES	FLOODPLAIN	0.32300
WILD PLUM	FLOODPLAIN	0.70000
ACORNS - BITTER	FLOODPLAIN	13.26000
ACORNS - WHITE	FLOODPLAIN	40.40000
BLACK WALNUT	FLOODPLAIN	95.20000
HAZELNUT MEATS	FLOODPLAIN	0.16830
CHENOPOD GREENS	FLOODPLAIN	0.54560
AMARANTH GREENS	FLOODPLAIN	2.62070
CHENOPOD SEEDS	FLOODPLAIN	400.14000
TUBERS SPRING	FLOODPLAIN	7.53500
TUBERS SUMMER	FLOODPLAIN	1.44920
TUBERS FALL	FLOODPLAIN	7.82470
TUBERS WINTER	FLOODPLAIN	4.92700
MAIZE	FLOODPLAIN	1570.92000
SQUASH	FLOODPLAIN	3141.84000
SUNFLOWER	FLOODPLAIN	315.00000
SUGAR MAPLE	BLUFFLINE	43.50000
VIBURNUMS	BLUFFLINE	0.36370
PAWPAW	BLUFFLINE	0.70000
ACORNS - BITTER	BLUFFLINE	15.47000
ACORNS - WHITE	BLUFFLINE	47.97500
POKE GREENS	BLUFFLINE	0.17900
BERRIES (RUBUS SP.)	UPLAND	0.05000
ACORNS - BITTER	UPLAND	61.88000
ACORNS - WHITE	UPLAND	164.12500
HICKORY NUTMEAT	UPLAND	13.19700
MUSHROOMS	UPLAND	0.50000

Table 13. Faunal Resource Availability Values Used in the Study.

SPECIES	TOPOGRAPHIC ZONE	USEABLE kg/ha
BEAR - SUMMER	BLUFFLINE	0.09649
BEAR - WINTER	BLUFFLINE	0.10678
BEAR - SPRING	BLUFFLINE	0.09134
BEAR - FALL	BLUFFLINE	0.12221
BOX TURTLE	BLUFFLINE	0.24700
RABBIT - FALL/WINTER	BLUFFLINE	0.79745
RABBIT - SPRING/SUMMER	BLUFFLINE	0.62024
SQUIRREL - WINTER	BLUFFLINE	0.13400
SQUIRREL - SPRING	BLUFFLINE	0.09077
SQUIRREL - SUMMER	BLUFFLINE	0.12363
SQUIRREL - FALL	BLUFFLINE	0.15669
BEAR - SUMMER	FLOODPLAIN	0.09649
BEAR - WINTER	FLOODPLAIN	0.10678
BEAR - SPRING	FLOODPLAIN	0.09134
BEAR - FALL	FLOODPLAIN	0.12221
BOX TURTLE	FLOODPLAIN	0.24700
DEER - SPRING	FLOODPLAIN	1.12643
DEER - SUMMER	FLOODPLAIN	1.14136
BEAVER	FLOODPLAIN	0.06754
MUSKRAT	FLOODPLAIN	3.72223
OPOSSUM	FLOODPLAIN	0.15438
RABBIT - FALL/WINTER	FLOODPLAIN	0.79745
RABBIT - SPRING/SUMMER	FLOODPLAIN	0.62024
RACCOON - WINTER	FLOODPLAIN	0.33242
RACCOON - SPRING	FLOODPLAIN	0.24932
RACCOON - SUMMER	FLOODPLAIN	0.26141
RACCOON - FALL	FLOODPLAIN	0.41553
SQUIRREL - WINTER	FLOODPLAIN	0.13400
SQUIRREL - SPRING	FLOODPLAIN	0.09077
SQUIRREL - SUMMER	FLOODPLAIN	0.12363
SQUIRREL - FALL	FLOODPLAIN	0.15669
TURKEY - FALL	FLOODPLAIN	0.32368
TURKEY - WINTER	FLOODPLAIN	0.32368
TURKEY - SPRING	FLOODPLAIN	0.25987
TURKEY - SUMMER	FLOODPLAIN	0.19580

Table 13. Continued.

SPECIES	TOPOGRAPHIC ZONE	USEABLE kg/ha
FISH	RIVER	242.06000
MUSSELS	RIVER	461.04000
WATER TURTLE	RIVER	3.33450
SNAPPER TURTLE	RIVER	0.14158
SOFTSHELL TURTLE	RIVER	0.12551
DUCKS	RIVER	1.40000
BEAR - SUMMER	UPLAND	0.09649
BEAR - WINTER	UPLAND	0.10678
BEAR - SPRING	UPLAND	0.09134
BEAR - FALL	UPLAND	0.12221
BOX TURTLE	UPLAND	0.24700
DEER - FALL	UPLAND	1.35131
DEER - WINTER	UPLAND	1.24222
OPOSSUM	UPLAND	0.01544
RABBIT - FALL/WINTER	UPLAND	0.79745
RABBIT - SPRING/SUMMER	UPLAND	0.62024
SQUIRREL - WINTER	UPLAND	0.13400
SQUIRREL - SPRING	UPLAND	0.09077
SQUIRREL - SUMMER	UPLAND	0.12363
SQUIRREL - FALL	UPLAND	0.15669
TURKEY - FALL	UPLAND	0.32368
TURKEY - WINTER	UPLAND	0.32368
TURKEY - SPRING	UPLAND	0.25987
TURKEY - SUMMER	UPLAND	0.19580

Table 14. Nutritional Values and Labor Costs Per 100 kg.

RESOURCE	SEASON	CALORIES (*1000)	PROTEIN (kg)	CALCIUM (g)	PHOSPHORUS (g)	IRON (g)	VITAMIN A (IU*1000)	THIAMIN (g)	RIBO-FLAVIN (g)	NIACIN (g)	ASCORBIC (g)	COST FRESH (manhr)	COST DRIED (manhr)
AMARANTH GREENS	SPRING	33.87	3.40	210.00	52.00	2.30	8800.00	0.11	0.31	1.27	98.70	44.00	-
BEAR	SPRING	134.29	23.00	12.00	213.00	3.00	551.00	0.85	0.47	6.82	1.30	440.00	475.00
BEAVER	SPRING	200.10	21.30	9.00	158.00	2.20	1101.00	0.10	0.39	5.05	1.80	170.00	205.00
BOX TURTLE	SPRING	110.99	18.20	107.00	183.00	3.20	1652.00	0.24	0.69	4.80	1.70	600.00	-
CHENOPODIUM GREENS	SPRING	33.87	3.40	210.00	52.00	2.30	8800.00	0.11	0.31	1.27	98.70	44.00	-
DEER	SPRING	125.75	21.00	10.00	249.00	2.60	826.00	0.23	0.51	6.30	0.00	97.00	132.00
DUCK	SPRING	254.26	20.20	10.00	176.00	1.60	1377.00	0.08	0.29	6.70	2.10	4178.00	-
FISH	SPRING	153.62	17.60	15.00	200.00	1.50	21.00	0.05	0.12	3.00	3.00	28.00	63.00
FISH DRIED	SPRING	153.62	17.60	12.00	124.00	1.50	2.00	0.02	0.06	2.60	0.00	18.00	33.00
GREENS (OTHER)	SPRING	29.86	2.40	74.00	58.00	1.40	11100.00	0.08	0.24	0.75	94.00	100.00	-
MUSHROOM	SPRING	49.71	4.97	9.94	201.00	1.50	2.00	0.17	0.80	7.21	4.97	110.00	-
MUSKRAT	SPRING	117.44	19.90	9.00	158.00	2.20	826.00	0.21	0.20	5.04	1.50	480.00	-
MUSKRAT DRIED	SPRING	117.44	19.90	7.00	98.00	2.20	83.00	0.10	0.10	4.38	0.00	-	543.00
OPOSSUM	SPRING	134.29	23.00	11.00	190.00	2.60	1101.00	0.00	0.40	6.06	1.80	269.00	304.00
POKE GREENS	SPRING	33.67	3.40	210.00	52.00	2.30	8800.00	0.11	0.31	1.27	98.70	44.00	-
RABBIT	SPRING	134.29	23.00	11.00	190.00	2.60	1101.00	0.00	0.40	6.06	1.80	269.00	304.00
RACCOON	SPRING	134.29	23.00	9.00	264.00	3.70	826.00	0.83	0.49	8.43	1.50	396.00	430.00
SNAPPING TURTLE	SPRING	69.27	15.60	107.00	220.00	2.00	19.00	0.22	0.71	7.00	2.00	179.00	-
SOFTSHELL TURTLE	SPRING	81.94	17.50	107.00	146.00	1.50	1652.00	0.25	0.71	2.60	1.70	274.00	-
SQUIRREL	SPRING	112.66	26.30	23.00	200.00	1.90	1101.00	0.07	0.35	4.00	1.10	1176.00	1211.00
TERRAPIN	SPRING	110.99	18.60	107.00	183.00	3.20	1652.00	0.24	0.69	4.80	1.70	165.00	-
TUBER	SPRING	69.90	2.30	14.00	78.00	3.40	20.00	0.20	0.06	1.30	4.00	60.00	85.00
TURKEY	SPRING	226.49	22.20	8.00	197.00	1.40	531.00	0.08	0.16	7.42	1.80	248.00	283.00
AMARANTH GREENS	SUMMER	33.87	3.40	210.00	52.00	2.30	8800.00	0.11	0.31	1.27	98.70	44.00	-
BEAR	SUMMER	214.24	20.60	11.00	190.00	2.60	551.00	0.76	0.42	6.06	1.30	416.00	431.00
BERRIES (RUBUS)	SUMMER	58.00	1.20	32.00	10.00	0.90	200.00	0.03	0.04	0.40	21.00	65.00	61.00
BLACK CHERRY	SUMMER	69.52	1.30	22.00	19.00	0.40	110.00	0.05	0.06	0.40	10.00	60.00	74.00
BLUEBERRIES	SUMMER	95.12	1.06	23.00	20.00	1.60	158.50	0.04	0.10	0.74	21.10	65.00	81.00
BOX TURTLE	SUMMER	110.99	18.20	107.00	183.00	3.20	1652.00	0.24	0.69	4.80	1.70	600.00	-
CHENOPOD GREENS	SUMMER	33.87	3.40	210.00	52.00	2.30	8800.00	0.11	0.31	1.27	98.70	44.00	-
DEER	SUMMER	138.43	20.80	10.00	246.00	2.60	826.00	0.23	0.51	6.24	1.50	96.00	111.00
DUCK	SUMMER	254.26	20.20	10.00	176.00	1.60	1377.00	0.08	0.29	6.70	2.10	4178.00	-
FISH	SUMMER	153.62	17.60	15.00	200.00	1.50	21.00	0.05	0.12	3.00	3.00	28.00	63.00
FISH DRIED	SUMMER	153.62	17.60	12.00	124.00	1.50	2.00	0.02	0.06	2.60	0.00	18.00	33.00
GRAPE	SUMMER	69.26	1.30	16.00	12.00	0.10	100.00	0.05	0.03	0.30	4.00	28.00	46.00
GREENS (OTHER)	SUMMER	29.86	2.40	74.00	58.00	1.40	11100.00	0.08	0.24	0.75	94.00	100.00	-

Table 14. Continued.

RESOURCE	SEASON	CALORIES (*1000)	PROTEIN (kg)	CALCIUM (g)	PHOSPHORUS (g)	IRON (g)	VITAMIN A (IU*1000)	THIAMIN (g)	RIBO-FLAVIN (g)	NIACIN (g)	ASCORBIC (g)	COST FRESH (manhr)	COST DRIED (manhr)
MAIZE (GREEN)	SUMMER	106.99	3.60	3.00	111.00	0.70	400.00	0.15	0.12	1.70	12.00	71.10	-
MUSKRAT	SUMMER	117.44	19.90	9.00	158.00	2.20	826.00	0.21	0.20	5.04	1.50	480.00	543.00
MUSKRAT DRIED	SUMMER	117.44	19.90	7.00	98.00	2.20	83.00	0.10	0.10	4.38	0.00	480.00	495.00
MUSSEL	SUMMER	73.80	9.00	845.00	445.80	19.46	17.00	0.00	0.25	1.45	0.30	40.00	-
OPOSSUM	SUMMER	169.71	22.00	10.00	180.00	2.50	1101.00	0.16	0.39	5.76	1.80	269.00	284.00
RABBIT	SUMMER	169.71	22.00	10.00	180.00	2.50	1101.00	0.16	0.39	5.76	1.80	269.00	284.00
RACCOON	SUMMER	373.67	15.90	10.00	182.00	2.50	826.00	0.57	0.35	5.81	1.50	378.00	398.00
SNAPPING TURTLE	SUMMER	89.27	15.80	107.00	220.00	2.00	19.00	0.22	0.71	7.00	2.00	179.00	-
SOFTSHELL TURTLE	SUMMER	81.94	17.50	107.00	146.00	1.50	1652.00	0.25	0.71	2.60	1.70	274.00	-
SQUASH	SUMMER	88.85	5.92	157.00	157.00	2.40	2428.00	0.32	0.50	5.03	62.20	13.30	-
SQUIRREL	SUMMER	278.24	20.80	18.00	158.00	1.50	1101.00	0.06	0.38	3.16	1.10	1000.00	1015.00
TERRAPIN	SUMMER	110.99	18.60	107.00	183.00	3.20	1652.00	0.24	0.69	4.80	1.70	165.00	-
TUBER	SUMMER	69.90	2.30	14.00	78.00	3.40	20.00	0.20	0.06	1.30	4.00	60.00	85.00
TURKEY	SUMMER	158.31	24.40	8.00	218.00	1.50	531.00	0.08	0.17	8.16	1.80	290.00	305.00
ACORNS - BITTER	FALL	470.69	5.60	46.00	242.00	1.30	150.00	0.17	0.04	2.00	0.00	160.00	170.00
ACORNS - WHITE	FALL	409.75	5.30	46.00	242.00	1.30	150.00	0.17	0.04	2.00	0.00	500.00	510.00
BEAR	FALL	334.17	17.00	9.00	158.00	2.20	551.00	0.62	0.34	5.05	1.30	328.00	363.00
BLACK WALNUT	FALL	627.72	20.50	0.00	570.00	6.00	300.00	0.22	0.11	0.70	2.00	887.00	897.00
CHENOPODIUM SEEDS	FALL	362.69	12.60	128.00	442.00	12.80	20.00	0.65	6.43	1.47	0.00	153.00	163.00
DEER	FALL	255.55	17.60	8.00	209.00	2.20	826.00	0.20	0.43	5.29	1.50	83.00	118.00
DUCK	FALL	254.26	20.20	10.00	176.00	1.80	1377.00	0.08	0.29	6.70	2.10	4178.00	-
FISH	FALL	153.62	17.60	15.00	200.00	1.50	21.00	0.05	0.12	3.00	3.00	28.00	63.00
FISH DRIED	FALL	153.62	17.60	12.00	124.00	1.50	2.00	0.02	0.06	2.60	0.00	-	33.00
HAWTHORN	FALL	92.00	0.40	85.00	25.00	2.10	303.00	0.05	0.05	0.43	22.30	65.00	81.00
HAZELNUT	FALL	633.98	12.60	209.00	337.00	3.40	25.00	0.46	0.41	0.90	0.00	1277.00	1287.00
HICKORY	FALL	672.92	13.20	0.00	360.00	2.40	150.00	0.34	0.26	0.80	1.00	247.00	277.00
MAIZE	FALL	354.24	9.80	16.00	202.00	4.10	125.00	0.30	0.13	1.50	0.00	71.10	83.70
MUSKRAT	FALL	117.44	19.90	9.00	158.00	2.20	826.00	0.21	0.20	5.04	1.50	480.00	-
MUSKRAT DRIED	FALL	117.44	19.90	7.00	98.00	2.20	83.00	0.10	0.10	4.38	0.00	-	543.00
MUSSEL	FALL	51.80	7.34	772.90	431.60	20.16	17.00	0.00	0.25	1.45	0.30	40.00	-
OPOSSUM	FALL	252.38	19.20	9.00	158.00	2.20	1101.00	0.14	0.34	35.05	1.80	184.00	219.00
PAWPAW	FALL	85.84	5.20	8.00	26.00	0.70	190.00	0.05	0.06	0.70	10.00	12.00	-
RABBIT	FALL	262.38	19.20	9.00	158.00	2.20	1101.00	0.14	0.34	35.05	1.80	184.00	219.00
RACCOON	FALL	441.37	13.80	9.00	158.00	2.20	826.00	0.60	0.31	5.05	1.50	242.00	277.00
SNAPPING TURTLE	FALL	69.27	15.80	107.00	220.00	2.00	19.00	0.22	0.71	7.00	2.00	179.00	-
SOFTSHELL TURTLE	FALL	81.94	17.50	107.00	146.00	1.50	1652.00	0.25	0.71	2.60	1.70	274.00	-

Table 14. Continued.

RESOURCE	SEASON	CALORIES (*1000)	PROTEIN (kg)	CALCIUM (g)	PHOSPHORUS (g)	IRON (g)	VITAMIN A (IU*1000)	THIAMIN (g)	RIBO-FLAVIN (g)	NIACIN (g)	ASCORBIC (g)	COST FRESH (manhr)	COST DRIED (manhr)
SQUASH DRIED	FALL	51.59	2.30	9.00	72.00	0.80	734.00	0.05	0.07	0.58	0.00	-	26.40
SQUIRREL	FALL	444.17	15.30	13.00	116.00	1.10	1101.00	0.04	0.26	2.32	1.10	542.00	577.00
SUNFLOWER	FALL	151.29	298.25	752.00	5247.47	44.52	303.00	12.28	1.43	33.72	0.00	410.00	417.56
TERRAPIN	FALL	110.99	18.60	107.00	183.00	3.20	1652.00	0.24	0.69	4.80	1.70	165.00	-
TUBER	FALL	69.90	2.30	14.00	78.00	3.40	20.00	0.20	0.06	1.30	4.00	60.00	85.00
TURKEY	FALL	342.65	18.40	6.00	162.00	1.20	531.00	0.06	0.13	6.12	1.80	146.00	181.00
VIBURNUM	FALL	66.39	1.70	31.00	22.00	1.00	303.00	0.05	0.05	0.43	22.30	28.00	46.00
WILD PLUM	FALL	75.28	0.80	12.00	18.00	0.50	300.00	0.03	0.03	0.50	4.00	28.00	46.00
BEAR	WINTER	254.20	19.40	10.00	174.00	2.40	551.00	0.72	0.39	5.56	1.30	169.00	239.00
DEER	WINTER	198.34	19.20	9.00	227.00	2.40	826.00	0.21	0.47	5.73	1.50	90.00	160.00
DUCK	WINTER	254.26	20.20	10.00	176.00	1.60	1377.00	0.08	0.29	6.70	2.10	4178.00	-
FISH	WINTER	153.62	17.60	15.00	200.00	1.50	21.00	0.05	0.12	3.00	3.00	28.00	63.00
FISH DRIED	WINTER	153.62	17.60	12.00	124.00	1.60	2.00	0.02	0.06	2.60	0.00	18.00	33.00
GEESE	WINTER	254.26	20.20	10.00	176.00	1.60	1377.00	0.08	0.29	6.70	2.10	598.00	-
MAPLE SUGAR	WINTER	348.00	0.00	143.00	11.00	1.40	10.00	0.01	0.01	0.10	0.00	327.00	337.00
MUSKRAT	WINTER	117.44	19.90	9.00	158.00	2.20	826.00	0.21	0.20	5.04	1.50	480.00	543.00
MUSKRAT DRIED	WINTER	117.44	19.90	7.00	98.00	2.20	83.00	0.10	0.10	4.38	0.00	480.00	495.00
OPOSSUM	WINTER	204.70	20.90	10.00	172.00	2.40	1101.00	0.15	0.37	5.50	1.80	219.00	289.00
RABBIT	WINTER	204.70	20.90	10.00	172.00	2.40	1101.00	0.15	0.37	5.50	1.80	219.00	289.00
RACCOON	WINTER	326.43	17.30	11.00	198.00	2.80	826.00	0.62	0.37	6.31	1.50	395.00	430.00
SNAPPING TURTLE	WINTER	69.27	15.80	107.00	220.00	2.00	19.00	0.22	0.71	7.00	2.00	179.00	-
SOFTSHELL TURTLE	WINTER	81.94	17.50	107.00	146.00	1.50	1652.00	0.25	0.71	2.60	1.70	274.00	-
SQUIRREL	WINTER	336.25	19.60	17.00	148.00	1.40	1101.00	0.05	0.30	2.96	1.10	634.00	704.00
TERRAPIN	WINTER	110.99	18.60	107.00	183.00	3.20	1652.00	0.24	0.69	4.80	1.70	165.00	-
TUBER	WINTER	69.90	2.30	14.00	78.00	3.40	20.00	0.20	0.06	1.30	4.00	60.00	85.00
TURKEY	WINTER	342.65	18.40	6.00	162.00	1.20	531.00	0.06	0.13	6.12	1.80	146.00	216.00

Table 15. Daily Dietary Requirements Used in the Models.

WINTER

Calories	Protein (g)	Calcium (g)	Phosphorus (g)	Iron (g)	Vitamin A (IU)	Thiamin (g)	Riboflavin (g)	Niacin (g)	Ascorbic Acid (g)
2200	42	.860	.860	.013	1450	0.9	.001	.012	.020

ALL OTHER SEASONS

Calories	Protein (g)	Calcium (g)	Phosphorus (g)	Iron (g)	Vitamin A (IU)	Thiamin (g)	Riboflavin (g)	Niacin (g)	Ascorbic Acid (g)
2200	42	.860	.860	.013	2900	0.9	.001	.012	.030

Resource Availability

The maximum resource availability values (potential yield estimates) and labor costs used in the present linear programming formulations (Tables 12, 13, and 14) were all derived from Reidhead (1981) except for four resources: sunflowers, mushrooms, mussels, and rabbits. The logic used in estimating the potential yield of sunflowers (315 kg/ha) was presented in the first chapter of this dissertation, but it is worth repeating here.

The potential yield estimate for sunflower cultivation used in this study was derived in a manner similar to that used by Reidhead (1981) in estimating maize and squash yields. Starting with an recent ethnographically derived, conservative production rate of 900 kg of seeds produced per hectare (Beard 1981:159), a figure of 630 kg/ha (30% less) was chosen as the potential Green River aboriginal production yield. Allowing for a 50% loss of the potential crop to insects, birds, disease, and other causes, reduces the estimated average sunflower seed harvest to 315 kg/ha.

The nutritional values for sunflower seeds used in the linear programming models presented below were obtained from the U.S. Department of Agriculture's (USDA) *Composition of Foods: Nut and Seed Products* (McCarthy 1984). According to the USDA (McCarthy 1984:131), 100 grams of dried sunflower seeds contain 570 kcal, 22.78 g protein, 116 mg calcium, 6.77 mg iron, 705 mg phosphorus, 50 IU vitamin A, 2.29 mg thiamin, 0.250 mg riboflavin, 4.5 mg niacin, and 0.0 g ascorbic acid.

In the case of sunflowers and other garden produce, the maximum resource availability values used in the present linear program calculations will depend on the amount of floodplain that lies within the catchment area, but only to the extent that once a 1.21 hectare (3.0 acre) threshold is met resource availability will not increase. The occurrence of larger floodplain areas within a site catchment will not result in an increase in garden plant resource availability since maximum garden plot size becomes the controlling factor when floodplain soils are available. Reidhead (1981:205) reports that aboriginal fields ranged in size from 0.5 to 3.0 acres per family, and adopted the 3.0 acre (1.21 ha) figure as the maximum allowed for cultivated plants in his linear program models. This figure is in agreement with Harris's (1972) observation that the garden plots among swidden agriculturalists are seldom greater than one hectare. The 1.21 ha threshold is, therefore, retained in the current study to maintain comparability with Reidhead's results and to remain as faithful as possible to ethnographic examples. Of those sites included in the present phase of analysis that contain portions of floodplain within their site catchment areas, all of them contain over 1.21 ha of floodplain. For this reason the 1.21 hectare maximum of productive garden zone area is used in all these cases to compute maximum resource potential for domesticated plants (maize, squash, sunflower), when the presumed mode of production includes gardening as a method of food production.

Those who might wonder why in the current study garden produce availability has been limited to floodplain zones, should know that ethnographic evidence indicates that aboriginal gardening in the Eastern Woodlands was primarily limited to floodplain soils. This is because with slash-and-burn (swiddening) method of clearing fields for planting (Sauer 1969:21; Swanton 1946:304-306; Watson 1969:76), floodplain soils were the most fertile (Smith 1978) and the most easily tilled with digging stick or hoe, the primary tilling implements that would have been available to the natives of the area in prehistoric times.

The estimated labor investment costs for planting, harvesting, processing, and storing 100 kg of sunflower seeds was assumed to be comparable to that estimated by Reidhead for the aboriginal production of maize. That figure was 1315.3 manhours/ha (532.5 manhours/acre). With an estimated average sunflower seed harvest of 315 kg/ha, the average cost per 100 kg of sunflower seed is calculated at 417.56 work hours. A slightly smaller cost figure of 410 hours per 100 kg of edible was adopted for the production of sunflower seeds without the benefit storage.

As was the case with sunflowers, the basis for estimating the potential availability of mushrooms (0.5 kg/ha) was presented previously in chapter one. The estimated labor costs for mushroom harvesting (1.1 manhours/kg) was based on personal observation while collecting morel mushrooms in the Park.

The nutritive values for mushrooms used in the linear programming models were obtained from the USDA's *Composition of Foods: Vegetables and Vegetable Products* (Haytowitz 1984). According to the USDA (Haytowitz 1984:228), 100 grams of fresh mushrooms contain 25 kcal, 2.09 g protein, 5 mg calcium, 1.24 mg iron, 104 mg phosphorus, 0.0 IU vitamin A, 0.102 mg thiamin, 0.449 mg riboflavin, 4.116 mg niacin, and 3.5 mg ascorbic acid.

Calculating the availability of mussels was based on the 61,472 mussels per hectare estimate obtained as a result of Manzano and Prentice's (1991) mussel population study, and an average mussel meat weight of 50 gm. Reidhead's (1981:141) 15% harvest rate for mussels has been adopted here to arrive at the 461.04 kg/ha availability figure presented in Table 13.

The nutritional values presented in Table 14 for freshwater mussels represents an average of the two most common species represented in this portion of the Green River today, three ridge mussels (*Amblema plicata*) and common muckets (*Actinonaias carinata*). Together, these two species represent 76% (*A. plicata* 43%, *A. carinata* 33%) of the mussels collected during the mussel population study. The values presented in Table 14 also reflect the different seasonal nutritional values that were presented previously in Table 3, with the Table 14 values weighted according to the relative proportion (43/33) by which these two mussel species were recovered in our study.

Rabbits were omitted in Reidhead's study, so the potential yield estimate used here (Table 13) was derived from Smith's (1975) study of Mississippian

faunal exploitation. Smith (1975:91-96) notes in his discussion on rabbits as a potential food source that cottontail population densities can vary greatly from year to year and season to season. Based on the population studies available to him, Smith adopted an estimated fall-winter cottontail population of 0.71 rabbit per hectare (1/3.5 acres, 180/mi^2) and a spring-summer population of 0.55 rabbit per hectare (1/4.5 acres, 142/mi^2) for his Mississippian exploitation model. This figures would indicate an 26.8% increase in the fall-winter population over the spring-summer breeding population, on average. These estimates have been adopted for the present study as well as Smith's (1975:96) estimate of 1.13 kg (2.5 lbs) average edible meat yield per rabbit. Assuming that the rabbit population can sustain an annual harvest rate of 25%, results in an estimated edible resource yield of 0.20058 and 0.15538 kg per hectare for fall-winter and spring-summer, respectively. The estimated labor costs for rabbit harvesting (2.69 manhours/kg in spring-summer; 1.84 manhours/kg in fall-winter) was based on the assumption that a figure close to that used for opossums would be appropriate, since both are more easily hunted in fall-winter using trapping (snares, deadfalls, etc.) and throwing stick methods.

Some explanation is also required for the acorn, black walnut, and pawpaw availability values used in the present study. Oak tree densities (trees/ha) used for this portion of the study were derived from values presented in Reidhead's (1981) southeastern Indiana study. These figures were used to

allow comparability between his study and the current one, and seems a reasonable approach given the relative proximity and similarities in topography and biotic communities exhibited between the two study areas. Reidhead (1981:183) found that white oaks composed 6.4% of the tree population in floodplain areas and other kinds of oaks (bitter acorn oaks) comprised 2.5% of the floodplain species in his study area. Likewise he found the proportions of white oaks and other oaks to be 7.5% and 3.0%, respectively, in the terrace/slope zones. In the upland areas, the respective proportions of white oaks and other oaks were 25.6% and 11.0%. Adapting these population assessments to the present study area results in a frequency of 93 oaks per hectare for upland areas (65 white oaks, 28 "other" oaks). For floodplain areas the tree densities are estimated to be 16 white to 6 other. For bluffline areas, 19 white and 7 "other" oak are the presumed frequencies.

In order to maintain comparability with Reidhead (1981), his yearly production values of 3.9 kg of unshelled white acorns per tree and 3.4 kg of unshelled bitter acorns per "other" oak tree were also used. Allowing for a 90% loss to animals and insects and nutmeat to total weight ratio of 65/100 (Reidhead 1981:184) results in a harvest of 2.525 kg of white acorn nutmeat per tree and 2.210 kg of bitter acorn nutmeat per "other" oak tree. The population estimates presented above for numbers of oak trees in each of the major topographic zones in conjunction with the nutmeat per tree production values just cited, results in the resource availability values cited for white and

bitter acorns presented in Table 12. These are 164.125 kg/ha and 61.88 kg/ha, respectively in upland areas; in bluffline areas, 47.975 kg/ha and 15.47 kg/ha; and, in floodplain areas, 40.40 kg/ha and 13.26 kg/ha.

In a similar fashion, Reidhead's (1981) figures for black walnut population densities in floodplain areas results in an estimated black walnut density of 14 trees per hectare for the current study. Again, using Reidhead's (1981:186-187) nutmeat to total nut weight ratio and harvestability estimates per walnut tree results in the 95.2 kg of useable nutmeat/ha value used here.

With regard to Reidhead's figures for pawpaw population densities in the bluffline areas, the decision was made in the present study to reduce the figure used by Reidhead by 7.7%. Reidhead (1981:177) used a estimated 340 pawpaw trees per mi^2 (259.11 ha) for slope and terrace areas in his southern Indiana study. With an estimated average potential of .70 kg of pawpaws per tree for human consumption, this results in a potential yield of .92 kg/ha for pawpaws. This figure has been reduced slightly to .70 kg/ha for current modeling purposes because the terrace areas in the present study area are fewer and smaller in extent compared to Reidhead's study area, and because the terrace areas appear to be the favorite habitat of this species (Little 1980:447).

Additional explanation is also appropriate regarding the way in which the availability of muskrats was calculated for the present study. Reidhead suggests using a figure of one specimen per 50 yards of river bank when

estimating muskrat populations. Within Mammoth Cave National Park there are roughly 63 miles of river bank. Using Reidhead's figure, this computes to a total of 2218 muskrats. The number of muskrats per hectare of river area (of which there are 260.28 ha) then calculates out to be 8.52. Assuming an average live weight of 1.04 kg per muskrat (Reidhead 1981:137), a useable meat weight of 0.728 kg per individual, and a 60% exploitability ratio, results in the usability value of 3.72223 kg of muskrat meat per hectare of river used here.

Problem Formulation

To illustrate how problems are structured and solved using the LP procedure in SAS, a simple example will be presented below where only eight resources (deer, fish, hickory, maize, mussel, rabbit, sunflower, and turkey) will be used to calculate the optimum solution for obtaining the minimum nutrient requirements with the least amount of effort for a family of seven for 90 days. Expressed verbally, the basic problem is: (1) minimize total labor costs (Z_{total}) where $Z_{total} = Z_{deer} * 83 + Z_{fish} * 28 + Z_{hickory} * 247 + Z_{maize} * 71.1 + Z_{mussel} * 40 + Z_{rabbit} * 184 + Z_{sunflower} * 184 + Z_{turkey} * 410$, (2) subject to the minimum dietary constraints: $X_{deer} * 255.55 + X_{fish} * 153.62 + X_{hickory} * 672.92 + X_{maize} * 354.24 + X_{mussel} * 51.80 + X_{rabbit} * 262.38 + X_{sunflower} * 570.00 + X_{turkey} * 342.85 \geq 1386$ (minimum kcalories requirement); $X_{deer} * 17.60 + X_{fish} * 17.60 + X_{hickory} * 13.20 + X_{maize} * 9.80 + X_{mussel} * 7.34 + X_{rabbit} * 19.20 + X_{sunflower} * 22.78 + X_{turkey} * 18.40 \geq 26.46$ (minimum protein requirement); etc., for all nutrients;

(3) subject to the non-negativity constraints: $X_{deer} \geq 0$, $X_{fish} \geq 0$, $X_{hickory} \geq 0$, $X_{maize} \geq 0$, $X_{mussel} \geq 0$, $X_{rabbit} \geq 0$, $X_{sunflower} \geq 0$, $X_{turkey} \geq 0$; and (4) subject to the maximum availability constraints: $X_{deer} \leq 1.767090$, $X_{fish} \leq 30.710150$, $X_{hickory} \leq 69.030210$, $X_{maize} \leq 1134.180675$, $X_{mussel} \leq 116.984290$, $X_{rabbit} \leq 0.345350$, $X_{sunflower} \leq 454.850550$, $X_{turkey} \leq 0.423270$.

The way in which this example problem is structured for the LP procedure in SAS is presented in Table 16. The reader will note that the first four lines and the last line of the example program are job control language (JCL) commands necessary for running the program on the University of Florida mainframe computer. The rest of the program commands are basic to SAS Version 6 and the LP procedure when the data are structured in the sparsedata format. The output generated by executing this example program is presented in Table 17.

According to the output of the example LP program shown in Table 16, the most cost effective way of obtaining the minimum nutritional requirements specified (1386 kcal, 26.46 g protein, etc.) is to appropriate 1.767090 (x100 kg) units of deer, 5.232619 (x100 kg) units of fish, 0.128572 (x100 kg) units of maize, 0.576043 (x100 kg) units of mussels, and 0.210386 (x100 kg) units of rabbit at a total cost of 364.076 hours. The solution meets the minimum nutritional requirements for calories, calcium, vitamin_a, and ascorbic acid and exceeds the minimum requirements for protein, phosphorus, iron, thiamin, riboflavin, and niacin.

Table 16. Formulation of Example Problem.

```
//EXAMPLE JOB (,,5,1),PRENTICE,CLASS=A,
//       USER=POTTERY,PASSWORD=
/*ROUTE PRINT NER.R0
// EXEC SAS
data;
    input _type_ $ @10 _col_ $13. @24 _row_ $16. _coef_;
    cards;
min         .           cost              .
ge          .           kcalories         .
ge          .           protein           .
ge          .           calcium           .
ge          .           phosphorus        .
ge          .           iron              .
ge          .           vitamin_a         .
ge          .           thiamin           .
ge          .           riboflavin        .
ge          .           niacin            .
ge          .           ascorbic          .
upperbd     .           available         .
.           deer        ascorbic          1.500000
.           deer        available         1.767090
.           deer        calcium           8.000000
.           deer        cost              83.000000
.           deer        iron              2.200000
.           deer        kcalories         255.550000
.           deer        niacin            5.290000
.           deer        phosphorus        209.000000
.           deer        protein           17.600000
.           deer        riboflavin        0.430000
.           deer        thiamin           0.200000
.           deer        vitamin_a         826.000000
.           fish        ascorbic          3.000000
.           fish        available         30.710150
.           fish        calcium           15.000000
.           fish        cost              28.000000
.           fish        iron              1.500000
.           fish        kcalories         153.620000
.           fish        niacin            3.000000
.           fish        phosphorus        200.000000
.           fish        protein           17.600000
.           fish        riboflavin        0.120000
.           fish        thiamin           0.050000
.           fish        vitamin_a         21.000000
.           hickory     ascorbic          0.000000
.           hickory     available         69.030210
.           hickory     calcium           0.000000
.           hickory     cost              247.000000
.           hickory     iron              2.400000
.           hickory     kcalories         672.920000
```

Table 16. Continued.

.	hickory	niacin	0.800000
.	hickory	phosphorus	360.000000
.	hickory	protein	13.200000
.	hickory	riboflavin	0.110000
.	hickory	thiamin	0.340000
.	hickory	vitamin_a	150.000000
.	maize	ascorbic	0.000000
.	maize	available	1134.180675
.	maize	calcium	16.000000
.	maize	cost	71.100000
.	maize	iron	4.100000
.	maize	kcalories	354.240000
.	maize	niacin	1.500000
.	maize	phosphorus	202.000000
.	maize	protein	9.800000
.	maize	riboflavin	0.130000
.	maize	thiamin	0.300000
.	maize	vitamin_a	125.000000
.	mussel	ascorbic	0.300000
.	mussel	available	116.984290
.	mussel	calcium	772.900000
.	mussel	cost	40.000000
.	mussel	iron	20.160000
.	mussel	kcalories	51.800000
.	mussel	niacin	1.450000
.	mussel	phosphorus	431.800000
.	mussel	protein	7.340000
.	mussel	riboflavin	0.250000
.	mussel	thiamin	0.000000
.	mussel	vitamin_a	17.000000
.	rabbit	ascorbic	1.800000
.	rabbit	available	0.345350
.	rabbit	calcium	9.000000
.	rabbit	cost	184.000000
.	rabbit	iron	2.200000
.	rabbit	kcalories	262.380000
.	rabbit	niacin	35.050000
.	rabbit	phosphorus	158.000000
.	rabbit	protein	19.200000
.	rabbit	riboflavin	0.340000
.	rabbit	thiamin	0.140000
.	rabbit	vitamin_a	1101.000000
.	sunflower	ascorbic	0.000000
.	sunflower	available	454.850550
.	sunflower	calcium	116.000000
.	sunflower	cost	410.000000
.	sunflower	iron	6.770000
.	sunflower	kcalories	570.000000
.	sunflower	niacin	4.500000

Table 16. Continued.

```
.          sunflower   phosphorus      705.000000
.          sunflower   protein          22.780000
.          sunflower   riboflavin        0.250000
.          sunflower   thiamin           2.290000
.          sunflower   vitamin_a        50.000000
.          turkey      ascorbic          1.800000
.          turkey      available         0.423270
.          turkey      calcium           6.000000
.          turkey      cost            146.000000
.          turkey      iron              1.200000
.          turkey      kcalories       342.850000
.          turkey      niacin            6.120000
.          turkey      phosphorus      162.000000
.          turkey      protein          18.400000
.          turkey      riboflavin        0.130000
.          turkey      thiamin           0.060000
.          turkey      vitamin_a       531.000000
.          _rhs_       cost              0.000
.          _rhs_       kcalories      1386.000
.          _rhs_       protein          26.460
.          _rhs_       calcium         541.800
.          _rhs_       phosphorus      541.800
.          _rhs_       iron              8.190
.          _rhs_       vitamin_a      1827.000
.          _rhs_       thiamin           .567
.          _rhs_       riboflavin        .630
.          _rhs_       niacin            7.560
.          _rhs_       ascorbic         18.900
proc lp sparsedata;
run;
/*
```

Table 17. Results of the Example LP Program.

VARIABLE SUMMARY

VARIABLE COL	NAME	STATUS	TYPE	PRICE	ACTIVITY	REDUCED COST
1	DEER		UPPERBD	83	1.767090	-64.142646
2	FISH	BASIC	UPPERBD	28	5.232619	0.000000
3	HICKORY		UPPERBD	247	0.000000	124.446
4	MAIZE	BASIC	UPPERBD	71.1	0.128572	0.000000
5	MUSSEL	BASIC	UPPERBD	40	0.576043	0.000000
6	RABBIT	BASIC	UPPERBD	184	0.210386	0.000000
7	SUNFLOWER		UPPERBD	410	0.000000	311.717
8	TURKEY		UPPERBD	146	0.000000	0.153221
9	KCALORIES		SURPLUS		0.000000	0.153221
10	PROTEIN	BASIC	SURPLUS		106.262	0.000000
11	CALCIUM		SURPLUS		0.000000	0.038482
13	PHOSPHORUS	BASIC	SURPLUS		1181.993	0.000000
14	IRON	BASIC	SURPLUS		16.149539	0.000000
15	VITAMIN_A		SURPLUS		0.000000	0.129659
16	THIAMIN	BASIC	SURPLUS		0.116074	0.000000
17	RIBOFLAVIN	BASIC	SURPLUS		0.990019	0.000000
18	NIACIN	BASIC	SURPLUS		25.887897	0.000000
19	ASCORBIC		SURPLUS		0.000000	0.387385

CONSTRAINT SUMMARY

CONSTRAINT ROW	NAME	TYPE	S/S COL	RHS	ACTIVITY	DUAL ACTIVITY
1	COST	OBJECT			364.076	.
2	KCALORIES	GE	10	1386	1386.00	0.153221
3	PROTEIN	GE	11	26.46	132.722	0.000000
4	CALCIUM	GE	12	541.8	541.800	0.038482
5	PHOSPHORUS	GE	13	541.8	1723.793	0.000000
6	IRON	GE	14	8.19	24.339539	0.000000
7	VITAMIN_A	GE	15	1827	1827.000	0.129659
8	THIAMIN	GE	16	0.567	0.683074	0.000000
9	RIBOFLAVIN	GE	17	0.63	1.620019	0.000000
10	NIACIN	GE	18	7.56	33.447897	0.000000
11	ASCORBIC	GE	19	18.9	18.900000	0.387385

The LP programs that were run in the current effort to model past decision-making behavior (Appendix I) contained many times more resource variables while integrating various coding conventions (which identified the resource, the season in which it was harvested, and the topographic zone in which it was obtained), and produced significantly larger outputs than the illustrative sample presented here. For example, when the coded variable "rabbitwibl" appears in the example LP programs listed in Appendix I it identifies the available resource as rabbit obtained in the winter season from the bluffline zone of the catchment area while "sunflofafl" indicates the resource as sunflower seeds obtained during the fall from the floodplain zone.

To make the results of these analyses more comprehensible, they have been reorganized into tables (Appendix II) in which the encoding has been fully deciphered, with the optimal resources and their proscribed "activities" printed in bold, with the availability value of each resource presented along with the optimal "activity" value, and with the cost in hours that would be expended for each resource in reaching the LP optimal solution. While this reorganization reduces the original computer output from several hundred pages to several scores of pages, it omits the activity information contained in the constraint summary. This information is useful for identifying which of the nutritional constraints were the most critical in reaching the optimal solution. But the decision was made to omit this information from the present study to conserve production costs, because in almost all of the cases where meeting the

minimum nutritional requirements was "infeasible" (not possible due to insufficient resources), it was due to insufficient amounts of calcium in the available resources. Those cases in which an infeasible determination was made due to lack of sufficient calcium or other nutritional constraints are noted.

Another piece of information omitted from Appendix II is the reduced cost column from the LP variable summary. This information can be useful in identifying those variables where a slight change in the "price" of a particular variable will result in a change in the optimal solution. Again, the attempt shall be made to eliminate any possible negative consequences which might result from this omission in information by pointing out those particular cases where such adjustments would suggest that another outcome is equally plausible provided small reductions in costs can be assumed for the variable(s) in question. Given the vagaries of estimating resource costs for past subsistence practices, this offers another way of evaluating each LP solution.

As is the case with many lines of inquiry, there is no single "right" way of modeling resource utilization using linear programming. An infinite number of scenarios can be constructed dependent upon the nature of the inquiry and the variables involved. In one respect, this makes linear programming a powerful tool in which an endless variety of combinations of variables can be analyzed to see how the outcome changes with minor or major adjustments to one or more conditions set within the problem. At the same time, this

flexibility also makes construction of any problem open to endless refinements and the incorporation of new assumptions. The question then becomes, "At what point does one begin or conclude analysis?" In this case the decision to conclude analysis was based on pragmatism and the knowledge that this is purely a heuristic exercise with no "true answer." Analysis was concluded when it was felt that two basic questions had been answered: (1) whether or not linear programming results reflected to some degree the archaeological record exhibited at each examined site, and (2) if the basic reasoning behind the settlement pattern interpretation offered here, that most of the sites in the study area represent fall and winter occupations within a larger settlement system which included the movement of peoples from spring/summer sites to fall/winter sites as various seasonal resources became available for exploitation, had been adequately evaluated.

Linear Programming Results

Initial Phase of Analysis

Faced with an infinite number of possible inquiries, the decision was made to begin the initial phase of inquiry by submitting programs for each site, for each season (spring, summer, fall, winter), and for each of three modes of subsistence (foraging, pre-maize gardening, and post-maize gardening). The programs were structured to reflect the following assumptions: (1) a household size of seven persons, (2) a period of site occupation lasting 90 days, (3) that the site inhabitants could utilize resources stored from the previous season at

the generally higher "stored" cost if storage was possible, and (4) where storage was a possibility, only half of the total annually available resources could be utilized at the lower "fresh" resource cost, while the remaining half could be utilized at the higher "stored" cost. The available resource mix was thus dependent upon the season of availability of each food source, the nature of each resource (wild, domesticated, storable, etc.), and the topographic zones contained within the catchment area around each site.

The sites selected for analysis were chosen on the basis of their physiographic location so that a representative sample of bottomland, bluffline, and upland sites were included in the sample and on the presence of floral and faunal evidence suitable enough to evaluate the generated models. Seven sites which met these criteria were selected (Table 11) for LP analysis. On the basis of their catchment area characterizations, these sites can be categorized into two types: four-zone sites and two-zone sites.

Four-zone sites (MACA-43, MACA-93, MACA-137, and MACA-171) are sites located near the Green River and contain portions of all four of the topographic zones (upland, bluffline, bottomland, and river) recognized in this step in the analysis. Two-zone sites (MACA-37, MACA-65, MACA-89) are located away from the river and contain only portions of upland and bluffline zones. To evaluate the influence of riverine resources in the four-zone site LP solutions, a hypothetical three-zone site (MACA-000) containing portions of all zones except the river zone was also created for evaluation.

As a direct consequence of the topographic zones which do or do not occur within each of the site catchment areas (Figure 19), certain plant and animal resources are included or excluded in the LP programs evaluated for each site. As a result, sites which share the same number of topographic zones tend to produce LP results which are similar in composition (Table 18). Slight variations in the proportions in which each topographic zone occurs within each catchment area can, however, result in the selection of different resources in the optimum solution. Such was the case with the results obtained from the first phase of LP inquiries where several patterns are apparent. These patterns have been summarized in Table 18, where each site has been grouped according to the optimal resource mix generated for each of the various LP programs just described. The exact quantities in which the optimal resources are to be harvested may vary slightly between similarly grouped sites, but overall the activity figures presented for each group of sites in Table 18 are nearly identical for each site included in the group.

Although the results of these analyses reveal that the basic problem formulations in this first phase of the LP analysis process were overly simplistic, they did reveal significant patterns. First, they show that with regard to the two-zone sites, three floral resources: acorns, pawpaws, and viburnums, will provide all of the nutritional requirements necessary to subsist at the least possible cost during the fall season. Also, with an inability to store pawpaws, deer becomes the alternate resource that replaces pawpaws in the

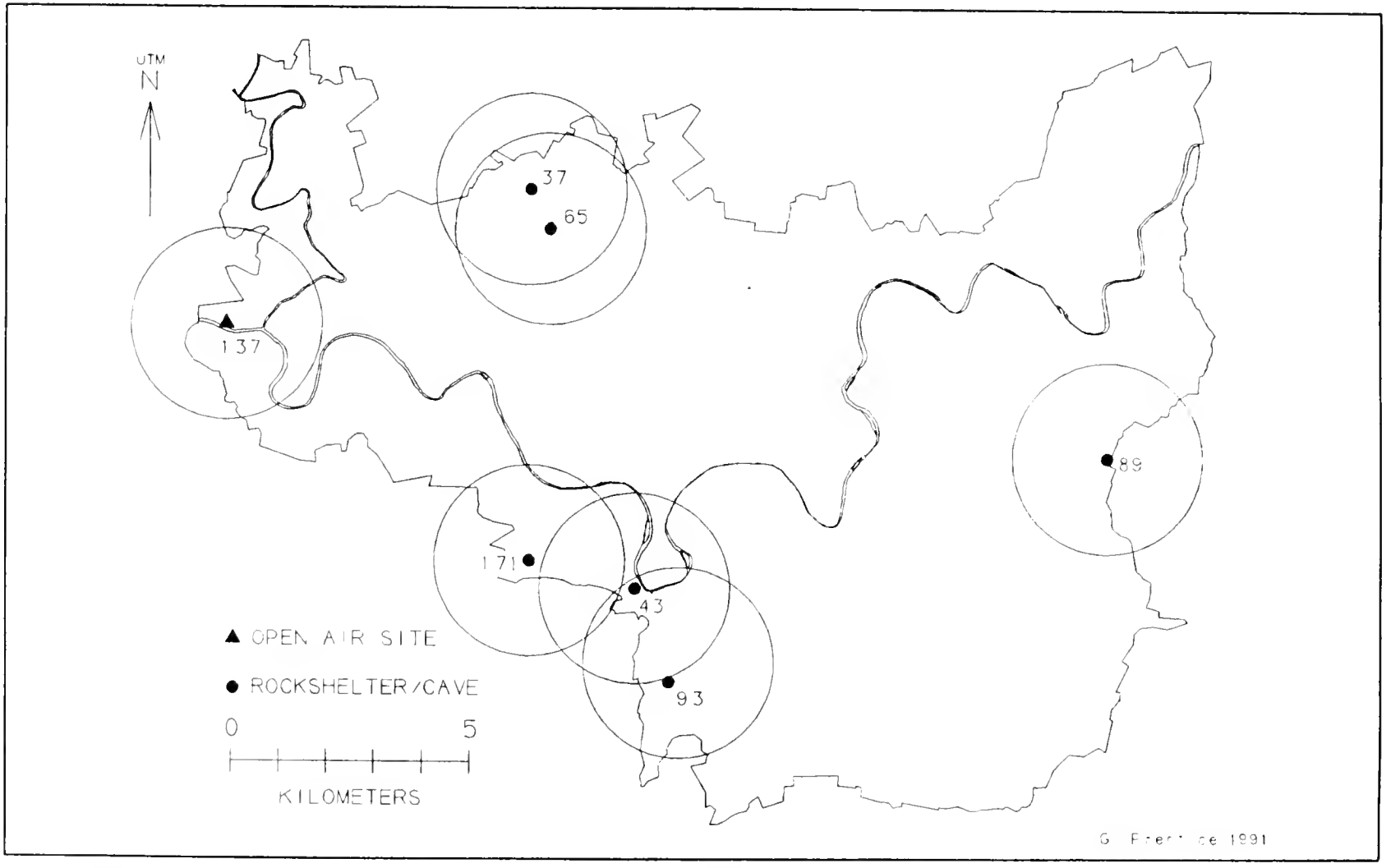

Figure 19. Sites Selected for Catchment Area and Linear Programming Analysis.

Table 18. Synthesis of LP Analysis For Two Seasons of Site Occupation.

RESOURCE	UNIT COST (hours/100 kg)	ACTIVITY (100 kg)	AVAILABLE (100 kg)	TOTAL COST (hours)
** FOUR-ZONE SITE; FALL (MACA-137, MACA-171, MACA-43, MACA-93)				
FORAGING, PRE-MAIZE, POST-MAIZE				
DEER	83.00	1.204437	3.534180	99.968
FISH	28.00	4.701540	61.420300	131.643
MUSSEL	40.00	0.557848	116.984290	22.313
PAWPAW	12.00	3.810100	3.810100	45.721
** Total **		10.273925	185.748870	299.646
** FOUR-ZONE SITE; WINTER, VARIATION I (MACA-137; MACA-171; MACA-43; MACA-93)				
FORAGING				
CHENOPODIUM SEEDS	163.00	3.686866	577.790160	600.959
DEER	90.00	0.263997	3.248870	23.759
HAWTHORN	81.00	0.072200	0.072200	5.848
VIBURNUM	46.00	1.979620	1.979620	91.062
** Total **		6.002683	583.090850	721.629
** FOUR-ZONE SITE; WINTER, VARIATION IIA (MACA-137, MACA-171)				
PRE-MAIZE, POST-MAIZE				
CHENOPODIUM SEEDS	163.00	3.943183	577.790160	642.738
HAWTHORN	81.00	0.072200	0.072200	5.848
RABBIT	219.00	0.027587	0.144820	6.041
SQUASH	26.40	0.746779	2268.361350	19.714
VIBURNUM	46.00	0.773107	1.979620	35.562
** Total **		5.562856	2848.348150	709.906
** FOUR-ZONE SITE; WINTER, VARIATION IIB (MACA-93)				
PRE-MAIZE, POST-MAIZE				
CHENOPODIUM SEEDS	163.00	2.769475	105.476900	451.424
HAWTHORN	81.00	0.013180	0.013180	1.067
OPOSSUM	219.00	0.006617	0.020350	1.449
SQUASH	26.40	1.442856	414.094510	38.091
VIBURNUM	46.00	0.591667	1.748960	27.216
** Total **		4.823795	521.353900	519.249

Table 18. Continued.

RESOURCE	UNIT COST (hours/100 kg)	ACTIVITY (100 kg)	AVAILABLE (100 kg)	TOTAL COST (hours)
** FOUR-ZONE SITE; SPRING, VARIATION I (MACA-137)				
FORAGING, PRE-MAIZE, POST-MAIZE				
AMARANTH GREENS	44.00	1.966522	3.784210	86.526
FISH	28.00	8.588686	61.420300	240.483
** Total **		10.555208	65.204510	327.010
** FOUR-ZONE SITE; SPRING, VARIATION IIA (MACA-43)				
FORAGING, PRE-MAIZE, POST-MAIZE				
AMARANTH GREENS	44.00	0.447232	2.828000	19.678
CHENOPODIUM GREENS	44.00	0.588760	0.588760	25.905
FISH	28.00	8.588686	40.629770	240.483
POKE GREENS	44.00	0.930530	0.930530	40.943
** Total **		10.555208	44.977060	327.010
** FOUR-ZONE SITE; SPRING, VARIATION IIB (MACA-171)				
FORAGING, PRE-MAIZE, POST-MAIZE				
AMARANTH GREENS	44.00	1.132164	1.316640	49.815
CHENOPODIUM GREENS	44.00	0.274110	0.274110	12.060
FISH	28.00	8.338970	8.338970	233.491
POKE GREENS	44.00	0.574930	0.574930	25.296
TURKEY	216.00	0.110439	1.430990	23.854
** Total **		10.430613	11.935640	344.518
** FOUR-ZONE SITE; SPRING, VARIATION IIC (MACA-93)				
FORAGING, PRE-MAIZE, POST-MAIZE				
AMARANTH GREENS	44.00	0.690820	0.690820	30.396
CHENOPODIUM GREENS	44.00	0.143820	0.143820	6.328
DEER	97.00	0.148460	0.148460	14.400
DEER	160.00	0.678939	4.679440	108.630
FISH	28.00	2.275360	2.275360	63.710
POKE GREENS	44.00	0.773469	0.860780	34.032
TURKEY	216.00	1.261960	1.261960	272.583
** Total **		5.972828	10.060640	530.081

Table 18. Continued.

RESOURCE	UNIT COST (hours/100 kg)	ACTIVITY (100 kg)	AVAILABLE (100 kg)	TOTAL COST (hours)
** FOUR-ZONE SITE; SUMMER, VARIATION IA (MACA-43, MACA-137)				
FORAGING				
AMARANTH GREENS	44.00	0.185836	2.828000	8.176
FISH	28.00	8.770240	40.629770	245.566
MUSSEL	40.00	0.439315	77.385560	17.572
** Total **		9.395391	120.843330	271.316
** FOUR-ZONE SITE; SUMMER, VARIATION IB (MACA-171)				
FORAGING				
CHENOPODIUM GREENS	44.00	0.184176	0.274110	8.103
FISH	63.00	0.359549	8.338970	22.651
FISH	28.00	8.338970	8.338970	233.491
MUSSEL	40.00	0.437945	15.882830	17.517
** Total **		9.320640	32.834880	281.764
** FOUR-ZONE SITE; SUMMER IC (MACA-93)				
FORAGING				
CHENOPODIUM GREENS	44.00	0.143820	0.143820	6.328
DEER	96.00	0.150430	0.150430	14.441
FISH	63.00	2.275360	2.275360	143.347
FISH	28.00	2.275360	2.275360	63.710
GRAPE	28.00	0.084660	0.084660	2.370
MUSSEL	40.00	2.975574	4.333780	119.022
TUBER	85.00	0.043109	0.993110	3.664
TUBER	60.00	0.191000	0.191000	11.460
** Total **		8.139313	10.447520	364.344
** FOUR-ZONE SITE; SUMMER II (MACA-137, MACA-171; MACA-43)				
PRE-MAIZE, POST-MAIZE				
SQUASH	13.00	15.599325	2268.361350	202.791
** Total **		15.599325	2268.361350	202.791

Table 18. Continued.

RESOURCE	UNIT COST (hours/100 kg)	ACTIVITY (100 kg)	AVAILABLE (100 kg)	TOTAL COST (hours)
** THREE-ZONE SITE; FALL (MACA-000)				
FORAGING; PRE-MAIZE; POST-MAIZE				
CHENOPODIUM SEEDS	153.00	3.188128	616.575730	487.783
HAWTHORN	65.00	0.077050	0.077050	5.008
PAWPAW	12.00	4.444317	5.688060	53.331
VIBURNUM	28.00	2.955350	2.955350	82.749
** Total **		10.664845	625.296190	628.873
** THREE-ZONE SITE; WINTER VARIATION I (MACA-000)				
FORAGING				
CHENOPODIUM SEEDS	163.00	3.554519	616.575730	579.386
HAWTHORN	81.00	0.077050	0.077050	6.241
RABBIT	219.00	0.034023	0.814940	7.451
VIBURNUM	46.00	2.579550	2.955350	118.659
** Total **		6.245142	620.423070	711.737
** THREE-ZONE SITE; WINTER, VARIATION II (MACA-000)				
PRE-MAIZE; POST-MAIZE				
CHENOPODIUM SEEDS	163.00	3.941137	616.575730	642.405
HAWTHORN	81.00	0.077050	0.077050	6.241
RABBIT	219.00	0.027674	0.814940	6.060
SQUASH	26.40	0.746707	2420.630630	19.713
VIBURNUM	46.00	0.768250	2.955350	35.339
** Total **		5.560818	3041.053700	709.759
** THREE-ZONE SITE; SPRING				
FORAGING; PRE-MAIZE; POST-MAIZE (MACA-000)				
BEAR	239.00	0.674060	0.674060	161.100
CHENOPODIUM GREENS	44.00	0.562567	0.840720	24.752
DEER	97.00	0.867860	0.867860	84.182
DEER	160.00	1.837550	1.837550	294.008
POKE GREENS	44.00	1.454520	1.454520	63.998
TUBER	60.00	5.805340	5.805340	348.320
TURKEY	248.00	0.076349	0.200220	18.934
TURKEY	216.00	0.728180	0.728180	157.286
** Total **		12.006426	12.408450	1152.584

Table 18. Continued.

RESOURCE	UNIT COST (hours/100 kg)	ACTIVITY (100 kg)	AVAILABLE (100 kg)	TOTAL COST (hours)
** THREE-ZONE SITE; SUMMER VARIATION I (MACA-000)				
FORAGING				
BLACK CHERRY	60.00	16.797619	77.045000	1007.857
CHENOPODIUM GREENS	44.00	0.696173	0.840720	30.631
DEER	96.00	0.879360	0.879360	84.418
GRAPE	28.00	0.494860	0.494860	13.856
** Total **		18.868012	79.259940	1136.763
** THREE-ZONE SITE; SUMMER VARIATION II (MACA-000)				
PRE-MAIZE; POST-MAIZE				
SQUASH	13.00	15.599325	2420.630630	202.791
** Total **		15.599325	2420.630630	202.791
** TWO-ZONE SITE; FALL (MACA-37, MACA-65; MACA-89)				
FORAGING, PRE-MAIZE, POST-MAIZE				
BITTER ACORNS	160.00	9.368959	101.602320	1499.033
PAWPAW	12.00	4.597390	4.597390	55.168
VIBURNUM	28.00	2.388670	2.388670	66.882
** Total **		16.355019	108.588380	1621.084
** TWO-ZONE SITE; WINTER (MACA-37, MACA-65; MACA-89)				
FORAGING, PRE-MAIZE, POST-MAIZE				
BITTER ACORNS	170.00	10.219122	95.545810	1737.250
DEER	90.00	0.231747	4.005540	20.857
VIBURNUM	46.00	2.246280	2.246280	103.328
** Total **		12.697149	101.797630	1861.436

Table 18. Continued.

RESOURCE	UNIT COST (hours/100 kg)	ACTIVITY (100 kg)	AVAILABLE (100 kg)	TOTAL COST (hours)
** TWO-ZONE SITE; SPRING AND SUMMER (MACA-37; MACA-65; MACA-89)				
FORAGING, PRE-MAIZE, POST-MAIZE **INFEASIBLE**				
BEAR	440.00	0.576600	0.576600	253.704
BEAR	239.00	0.674060	0.674060	161.100
BOX TURTLE	600.00	1.559210	1.559210	935.526
DEER	160.00	3.762370	3.762370	601.979
MUSHROOM	110.00	3.028750	3.028750	333.162
POKE GREENS	44.00	1.175620	1.175620	51.727
RABBIT	269.00	0.980850	0.980850	263.848
RABBIT	289.00	1.266180	1.266180	365.926
SQUIRREL	1176.00	0.573000	0.573000	673.848
SQUIRREL	704.00	0.845890	0.845890	595.506
TURKEY	248.00	0.787080	0.787080	195.195
TURKEY	216.00	0.980350	0.980350	211.755
** Total **		16.209960	16.209960	4643.279

two-zone site optimal resource mix during winter. Second, they show that two-zone sites located away from the Green River such as MACA-37, MACA-65, and MACA-89 cannot support a population of seven persons for 90 days during the spring and summer seasons; the solutions in all these cases are infeasible because insufficient resources are present within the catchment areas to provide the specified minimum nutritional requirements. Only the fall and winter periods can sustain these groups at the specified levels, and they can be sustained in the winter only because of the ability to store fall resources for consumption in winter.

The reason for the infeasible solution for these two-zone sites during the spring is insufficient calcium. An insufficient amount of calcium is also the case in summer, but there are also insufficient calories and ascorbic acid for all three sites during this time of the year. Clearly in comparison with the other sites included in the sample, specifically the four-zone sites, the two-zone sites are poorly situated to take advantage of the resources that are most easily appropriated in spring and summer. Thus based on the LP results, one would expect that two-zone sites would primarily be occupied in the fall and winter months when subsistence resources are in greater abundance within these catchment areas. As will be shown later in the next chapter, the archaeological record conforms to this expectation.

Other patterns emerged during the initial phase of LP investigations among the near river, four-zone sites (MACA-137, MACA-171, MACA-43, and

MACA-93). During the fall of the year, regardless of the mode of subsistence (foraging, pre-maize gardening, or post-maize gardening) pursued by the households at the four-zone sites, a combination of wild resources: deer, fish, mussels, and pawpaws, would have provided the most economical means of satisfying the 90 day minimum nutritional requirements of the site occupants. To acquire all of these resources, access to the river zone (for fish and mussels), the upland zone (for deer) and the bluffline zone (pawpaws) is necessary. This combination of wild plant and animal resources provided the least costly resource mix by far (299.65 hours compared to 628.87 hours for the hypothetical three-zone site and 1621.08 hours for two-zone sites) for all seven sites for the fall season. This would appear to indicate that if the LP models reflect in any way the decision-making considerations that were weighed in the past when individuals selected habitation sites during the fall of the year, then regular access to all four topographic zones would have been favored. This is in accord with the pattern noted earlier for the distribution of large upland and large bottomland sites which generally occur at locations which permit easy access to both upland and bottomland zones.

During the winter season, wild resources (chenopodium seeds, hawthorn, and viburnum) again predominated the optimal solution for all four-zone sites for all three subsistence modes. Deer rounds out the diet in the foraging model, but is replaced by squash and rabbit or opossum in both (pre-maize and post-maize) gardening models. Rabbit and opossum are interchangeable in the

solution mix because they provide essentially the same nutrients at identical costs.

In the spring, if fish and amaranth are available in sufficient quantities within the four-zone site catchment areas, these two wild resources will satisfy the needs of the initial models at the least cost. In those cases where four-zone sites have more limited amounts of amaranth resources, as is the case with MACA-43, then other greens (chenopodium and poke) are used as alternatives since they are equal in cost with similar nutritional benefits. If fish resources are also limited, then turkey is added as a substitute (spring variation IIb). If fish resources are limited further still, and turkey is not available in sufficient numbers to fill the void, then deer is added to the optimal solution (variation IIc). All of these resources are obtained from either the bottomland/floodplain zone or the river.

In the summer of the year, another riverine resource, mussels, is added to the spring optimal diet of amaranth and fish at four-zone sites to produce the solution of least cost for all of the two-season LP foraging models. Total expenditure is only 271.32 hours for the three month period, among the lowest of all the two-season models. A slightly higher cost is the result if fresh fish resources are somewhat limited, in which case dried fish is to be used to augment the diet (summer variation IIb). As one moves further from the river, whereby fish resources of both types become available in fewer quantities, as is the case with MACA-93, the optimal solution mix is expanded to include

grapes, deer, and tubers (both fresh and dried). Once again, all of these are bottomland resources. As a result of the need to appropriate a wider range of resources, the total foraging cost for MACA-93 is increased significantly to 364.34 hours, 34% greater than that obtained for the four-zone site summer variation Ia group.

The only seasonal models that provided total expenditure costs below that obtained for the four-zone site summer variation Ia group, was a summer diet of pure squash for four-zone site pre-maize and post-maize gardening LP models. Squash (another floodplain resource) alone was the optimal solution in these cases because the extremely low cost of squash production dictated the single resource solution.

This was also the case for the imaginary three-zone site included in the sample, MACA-000. Hypothetically located at a distance from the river which excluded riverine resources from the catchment area but included bottomland resources (including squash), MACA-000 shared patterns with both the two-zone and four-zone sites. As a result, MACA-000 mimicked the four-zone sites in minimizing total resource costs by choosing the bottomland resource, squash, as the sole resource to be consumed in summer for both pre-maize and post-maize subsistence modes. The summer foraging model for MACA-000 consisted of black cherries, deer, grapes, and chenopodium greens, a pattern which resembles that exhibited by MACA-93 (four-zone summer variation Ic) the four-zone site furthest removed from the Green River.

In all three (foraging, pre-, and post-maize) of the fall LP solutions, MACA-000 resembles the four-zone winter sites by including the use of viburnums from the bluffline areas and hawthorns and chenopodium seeds from the bottomland zone while also including the fall constant, pawpaws, from the bluffline areas. Likewise, in the winter, the basic four-zone site winter pattern is repeated with pawpaws being replaced with rabbit in the foraging model and squash and rabbit in the pre-maize and post-maize models.

In the spring, the optimal resource mix for MACA-000 for all three modes of subsistence consists of bear, chenopodium greens, poke greens, tubers, deer (both fresh and stored), and turkey (both fresh and stored). This solution, with its heavy reliance on mammal resources, reflects the higher cost of excluding the riverine component from the available resources at this time of the year. The total cost of the MACA-000 spring solution is over 1150 hours compared to the four-zone solution of 327.01 hours.

Summarizing the Two-season LP Results

Comparing and contrasting the results of the various LP programs which generated optimal resource solutions using a two season exploitation model and three modes of subsistence, has revealed several overall patterns regarding optimal resource use and the likely consequences that implementing these solutions would have had with respect to past site selection processes. All of the resources identified in the optimal solutions for spring and summer were resources that were obtainable in the bottomland and riverine zones. When

riverine and bottomland resources are excluded from the spring and summer models, as was the case for the two-zone sites (MACA-37, MACA-65, and MACA-89), the solution to the LP model becomes infeasible because insufficient amounts of calcium, calories, and ascorbic acid are available in the site catchment area. Thus, from both a foraging and a gardening perspective, the two-season LP models demonstrate that during the spring and summer seasons the least cost solutions would predict the placement of prehistoric occupations at locations from which the inhabitants could most effectively exploit the bottomland and riverine zones. Likewise, one would expect that sites located away from the river, like the two-zone sites, represent short term occupations which focus on the utilization of fall upland resources since this is the period in which the least amount of effort will support a household in these locations.

Somewhat surprisingly, maize as a potential contributing element of the economical solutions to the minimum nutritional requirements was excluded in all the two-season LP models. Combinations of wild resources provided all of the dietary requirements for all seasons regardless of the mode of subsistence, except for where the extremely low production costs associated with squash gardening resulted in the addition of stored squash to the winter assemblages and pure squash diets in the summer at both three- and four-zone sites. Squash was excluded in the fall assemblages because pawpaws were available at a lower cost at this time of the year.

On a season by season basis, the two-season LP models identify patterns in resource availability which one could expect would have consequences in the archaeological record. In the summer, primary resources that should be exploited include freshwater mussels, fish, deer, tubers and greens (amaranth, chenopodium, and poke). Comparing the importance of faunal to floral resources, one finds the highest recommended use of faunal resources during summer with fish and mussels constituting 94-98% by weight of the optimal diet among the four-zone site solutions, excluding the summer II group (squash) solution. Once squash fruits become established as basic food resources, they should also rise in prominence in the summer diet.

In the fall, pawpaws are utilized to the maximum in every optimal solution. Viburnums are also frequently chosen (2 out of 3) as a optimal resource in the fall. If riverine resources are available, mussels and fish will be exploited; otherwise chenopodium, deer, hawthorn, and acorns are to be expected in the resource mix. The lowest proportion by weight in which floral resources share in the various optimal fall solutions is 37%, the greatest (two out of three cases) is 100%.

In the winter, chenopodium seeds, viburnums, hawthorns, and deer can be expected to be preferred resources. Theoretically, chenopodium seeds, viburnums, and hawthorns should constitute most of the entire winter diet. Rabbits and opossums can also be expected to form significant contributions

to the winter resource mix. Dried squash fruit is to be expected in minor amounts as well.

In the spring, faunal resources are once again at a premium compared to the previous two seasons when nutritional requirements can be satisfied more easily with floral resources. In the feasible solutions, fish, deer, turkey, and bear are to be exploited. The feasible spring solution with the lowest reliance on faunal resources (three-zone, spring) utilizes them at the overall proportion of 34.8% by weight while the greatest reliance on faunal resources in spring (four-zone, variation I) occurs with fish constituting 81% of the total diet.

There are problems, obviously, with accepting these results at face value. For example, a summer diet of pure squash may best satisfy the economical side of meeting the minimum nutritional requirements of a household, but it ignores considerations such as dietary tastes and daily consumption limits. Besides the fact that implementing such a solution would require the ingestion of 2.63 kg (5.8 lb) of squash flesh per person per day, a three month long diet of pure squash would probably exceed the culinary sensibilities (and probably the intestinal limits) of most persons.

Similarly, the consumption of bitter acorns in the quantities indicated in the two-zone site fall and winter solutions are probably unrealistic. It would require the consumption of something in the neighborhood of 1.6 kg (3.5 lb) of acorn nutmeat per person per day. Examination of the archaeological record

at these and other sites in the study area do not support the hypothesis that acorns were ever eaten in the proportions predicted by the two-season LP models. A cultural preference for hickory nuts over bitter acorns probably offers the most likely explanation why the LP models fail to accurately reflect the importance of acorns in the fall diet. Alternative explanations are that the true cost of bitter acorn harvesting and processing is under estimated in the LP models, or preservation factors have resulted in an under-representation of actual acorn use in the archaeological record.

Other assumptions made in the initial LP programs were also thought to be at most unrealistic and at least questionable, particularly the limit placed on the storage of resources. For these reasons, a new set of assumptions was made and a new series of programs was subjected to LP analysis.

Subsequent Analysis

The next phase in LP analysis incorporated the following assumptions: (1) that acorns were not considered good food and were excluded, therefore, as potential resources, (2) that squash was likewise not available, eliminating the unrealistic solution of a pure squash summer diet (and thereby excluding the pre-maize mode of subsistence), (3) that food could be stored from the two preceding seasons, not just one, and (4) that fish caught in the spring would cost twice as much as spring fish in the initial programs due to the difficulty of catching them during the annual spring floods. The number of individuals in each household was kept at seven as was the 90 day site occupation period;

however, the availability in which each resource could be obtained at fresh or stored cost was adjusted in accord with the annual availability of the resource and the expanded number of prior seasons from which storable resources could be used during the 90 days of site occupation. The results of this second suite of LP programs are presented in Table 19 in a fashion similar to that found in Table 18 to permit easier comparisons of similarities and differences.

In many ways, the new assumptions have produced patterns that were similar to those obtained in the initial LP programs. In other ways, there have been significant changes in the optimal results.

For the four-zone sites, the lowest cost solution for the fall season remains relatively unchanged from the previous two-season model with deer (upland), pawpaws (bluffline), fish (river), and mussels (river), once again forming the basis of the optimal solution for a foraging subsistence mode. But as a direct result of the reduction in the available resources that can be obtained at the lower "fresh" cost because of the extended two season storage allowance, the importance of deer has risen in comparison to fish in reaching the optimal solution. Wild plums have also been added to the majority of the fall optimal solutions. And once again, as sites become located farther and farther from the river and the availability of riverine and bottomland resources are reduced, higher cost resources are added to the solution. For MACA-93, the four-zone site furthest removed from the river, the result is the addition of blueberries, hawthorns, dried fish, and hickory.

Table 19. Synthesis of LP Analysis For Three Seasons of Site Occupation.

RESOURCE	UNIT COST (hours/100 kg)	ACTIVITY (100 kg)	AVAILABLE (100 kg)	TOTAL COST (hours)
** FOUR-ZONE SITE; FALL VARIATION IA (MACA-171, MACA-43)				
FORAGING (NO ACORNS)				
DEER	83.00	2.722146	2.987070	225.938
FISH	28.00	4.169485	4.169485	116.745
MUSSEL	40.00	0.589574	15.882830	23.582
PAWPAW	12.00	0.224830	0.224830	2.697
** Total **		7.706035	23.264215	368.964
** FOUR-ZONE SITE; FALL VARIATION IB (MACA-93)				
FORAGING (NO ACORNS)				
BLUEBERRIES	81.00	0.174061	0.240440	14.098
DEER	83.00	2.545190	2.545190	211.250
FISH	28.00	1.137680	1.137680	31.855
FISH	63.00	1.137680	1.137680	71.673
HAWTHORN	65.00	0.013180	0.013180	0.856
HICKORY	247.00	0.436149	99.426200	107.728
MUSSEL	40.00	0.617515	4.333780	24.700
PAWPAW	12.00	0.336620	0.336620	4.039
WILD PLUM	28.00	0.184520	0.184520	5.166
** Total **		6.582595	109.355290	471.370
** FOUR-ZONE SITE; FALL VARIATION IC (MACA-137)				
FORAGING, POST-MAIZE (NO ACORNS OR SQUASH)				
DEER	83.00	1.767090	1.767090	146.668
FISH	28.00	5.398231	30.710150	151.150
MUSSEL	40.00	0.565094	116.984290	22.603
PAWPAW	12.00	0.381010	0.381010	4.572
WILD PLUM	28.00	0.573408	1.010780	16.055
** Total **		8.684833	150.853320	341.050
** FOUR-ZONE SITE; FALL VARIATION II (MACA-171)				
POST-MAIZE (NO ACORNS OR SQUASH)				
DEER	83.00	1.847399	2.987070	153.334
FISH	28.00	4.169485	4.169485	116.745
MAIZE	71.10	0.568503	394.615105	40.420
MUSSEL	40.00	0.582212	15.882830	23.288
PAWPAW	12.00	0.224830	0.224830	2.697
WILD PLUM	28.00	0.299371	0.351680	8.382
** Total **		7.691800	418.231000	344.869

Table 19. Continued.

RESOURCE	UNIT COST (hours/100 kg)	ACTIVITY (100 kg)	AVAILABLE (100 kg)	TOTAL COST (hours)
** FOUR-ZONE SITE; FALL VARIATION III (MACA-93)				
POST-MAIZE (NO ACORNS OR SQUASH)				
BERRIES (RUBUS)	81.00	0.013180	0.013180	1.067
BLUEBERRIES	81.00	0.240440	0.240440	19.475
DEER	83.00	1.547398	2.545190	128.434
FISH	28.00	1.137680	1.137680	31.855
HAWTHORN	65.00	0.013180	0.013180	0.856
MAIZE	71.10	1.941932	207.047255	138.071
MAIZE	83.70	0.269647	207.047255	22.569
MUSSEL	40.00	0.606154	4.333780	24.246
PAWPAW	12.00	0.336620	0.336620	4.039
WILD PLUM	28.00	0.184520	0.184520	5.166
** Total **		6.290751	422.899100	375.781
** FOUR-ZONE SITE; WINTER (MACA-137, MACA-171; MACA-43, MACA-93)				
FORAGING, POST-MAIZE (NO ACORNS OR SQUASH)				
BERRIES (RUBUS)	81.00	0.072200	0.072200	5.848
BLACK CHERRY	74.00	0.527121	72.198500	39.006
BLUEBERRIES	81.00	0.272150	0.272150	22.044
CHENOPODIUM SEEDS	163.00	3.898944	577.790160	635.527
DEER	90.00	0.478028	1.624435	43.022
HAWTHORN	81.00	0.072200	0.072200	5.848
WILD PLUM	46.00	1.010780	1.010780	46.495
** Total **		6.331423	653.040425	797.793
** FOUR-ZONE SITE; SPRING VARIATION I (MACA-137, MACA-43)				
FORAGING (NO ACORNS)				
AMARANTH GREENS	44.00	1.966522	3.784210	86.526
FISH	56.00	8.588686	30.710150	480.966
** Total **		10.555208	34.494360	567.493
** FOUR-ZONE SITE; SPRING IIA (MACA-93)				
FORAGING (NO ACORNS)				
AMARANTH GREENS	44.00	0.690820	0.690820	30.396
CHENOPODIUM GREENS	44.00	0.025597	0.143820	1.126
CHENOPODIUM SEEDS	163.00	2.790797	105.476900	454.899
FISH	63.00	1.137680	1.137680	71.673
FISH	56.00	1.137680	1.137680	63.710
** Total **		5.782574	108.586900	621.806

Table 19. Continued.

RESOURCE	UNIT COST (hours/100 kg)	ACTIVITY (100 kg)	AVAILABLE (100 kg)	TOTAL COST (hours)
** FOUR-ZONE SITE; SPRING VARIATION IIB (MACA-171)				
FORAGING, PRE-MAIZE (NO ACORNS OR SQUASH)				
AMARANTH GREENS	44.00	1.316640	1.316640	57.932
CHENOPODIUM GREENS	44.00	0.025506	0.274110	1.122
CHENOPODIUM SEEDS	163.00	0.110386	201.030340	17.992
FISH	63.00	4.169485	4.169485	262.677
FISH	56.00	4.169485	4.169485	233.491
POKE GREENS	44.00	0.574930	0.574930	25.296
** Total **		10.366432	211.534990	598.512
** FOUR-ZONE SITE; SPRING VARIATION IIIA (MACA-43, MACA-137)				
POST-MAIZE (NO ACORNS OR SQUASH)				
AMARANTH GREENS	44.00	2.298642	3.784210	101.140
MAIZE	83.70	3.692821	1134.180675	309.089
** Total **		5.991463	1137.964885	410.229
** FOUR-ZONE SITE; SPRING VARIATION IIIB (MACA-171, MACA-93)				
POST-MAIZE (NO ACORNS OR SQUASH)				
AMARANTH GREENS	44.00	1.316640	1.316640	57.932
CHENOPODIUM GREENS	44.00	0.274110	0.274110	12.060
CHENOPODIUM SEEDS	163.00	0.248334	201.030340	40.478
MAIZE	83.70	3.451276	394.615105	288.871
POKE GREENS	44.00	0.574930	0.574930	25.296
** Total **		5.865290	597.811125	424.640
** FOUR-ZONE SITE; SUMMER IA (MACA-137)				
FORAGING, POST-MAIZE (NO ACORNS OR SQUASH)				
AMARANTH GREENS	44.00	0.330834	3.784210	14.556
FISH	28.00	8.519566	30.710150	238.547
MUSSEL	40.00	0.399062	116.984290	15.962
TUBER	60.00	0.523150	0.523150	31.389
** Total **		9.772612	152.001800	300.456

Table 19. Continued.

RESOURCE	UNIT COST (hours/100 kg)	ACTIVITY (100 kg)	AVAILABLE (100 kg)	TOTAL COST (hours)
** FOUR-ZONE SITE; SUMMER IB (MACA-43)				
FORAGING, POST_MAIZE (NO ACORNS OR SQUASH)				
CHENOPODIUM GREENS	44.00	0.554449	0.588760	24.395
FISH	28.00	8.556372	20.314885	239.578
MUSSEL	40.00	0.345026	77.385560	13.801
TUBER	60.00	0.390960	0.390960	23.457
** Total **		9.846807	98.680165	301.232
** FOUR-ZONE SITE; SUMMER II (MACA-93)				
FORAGING (NO ACORNS)				
BLUEBERRIES	65.00	0.240440	0.240440	15.628
CHENOPODIUM GREENS	44.00	0.006356	0.143820	0.279
DEER	96.00	0.075215	0.075215	7.220
DEER	160.00	2.323955	2.339720	371.832
FISH	89.00	1.137680	1.137680	101.253
FISH	28.00	1.137680	1.137680	31.855
MUSSEL	40.00	4.333780	4.333780	173.351
TURKEY	216.00	0.630980	0.630980	136.291
** Total **		9.886086	10.039315	837.713
** FOUR-ZONE SITE; SUMMER III (MACA-171)				
FORAGING, PRE-MAIZE (NO ACORNS OR SQUASH)				
BEAR	239.00	0.075433	0.085740	18.028
CHENOPODIUM GREENS	44.00	0.166334	0.274110	7.318
DEER	96.00	0.143355	0.143355	13.762
FISH	89.00	4.169485	4.169485	371.084
FISH	28.00	4.169485	4.169485	116.745
GRAPE	28.00	0.161350	0.161350	4.517
MUSSEL	40.00	0.493438	15.882830	19.737
TUBER	60.00	0.182020	0.182020	10.921
** Total **		9.560900	25.068375	562.115

Table 19. Continued.

RESOURCE	UNIT COST (hours/100 kg)	ACTIVITY (100 kg)	AVAILABLE (100 kg)	TOTAL COST (hours)
** FOUR-ZONE SITE; SUMMER IVA (MACA-171)				
POST-MAIZE (NO ACORNS OR SQUASH)				
AMARANTH GREENS	44.00	0.079510	1.316640	3.498
FISH	28.00	4.169485	4.169485	116.745
GRAPE	28.00	0.161350	0.161350	4.517
MAIZE	71.10	2.278081	394.615105	161.971
MUSSEL	40.00	6.610891	15.882830	264.435
** Total **		13.299317	416.145410	551.169
** FOUR-ZONE SITE; SUMMER IVB (MACA-93)				
POST-MAIZE (NO ACORNS OR SQUASH)				
FISH	89.00	1.137680	1.137680	101.253
FISH	28.00	1.137680	1.137680	31.855
GRAPE	28.00	0.084660	0.084660	2.370
MAIZE	71.10	4.621284	207.047255	328.573
MUSSEL	40.00	4.333780	4.333780	173.351
TURKEY	216.00	0.630980	0.630980	136.291
** Total **		11.946064	214.372035	773.695
** THREE-ZONE SITE; FALL (MACA-000)				
FORAGING, POST-MAIZE (NO ACORNS OR SQUASH)				
BERRIES (RUBUS)	81.00	0.077050	0.077050	6.241
BLUEBERRIES	81.00	0.161251	0.406290	13.061
CHENOPODIUM SEEDS	153.00	3.893828	616.575730	595.755
DEER	83.00	0.999465	0.999465	82.955
DEER	132.00	0.077981	0.433930	10.293
DEER	111.00	0.439680	0.439680	48.804
HAWTHORN	65.00	0.077050	0.077050	5.008
PAWPAW	12.00	0.568810	0.568810	6.825
WILD PLUM	28.00	1.078630	1.078630	30.201
** Total **		7.373745	620.656635	799.147
** THREE-ZONE SITE; SPRING I (MACA-000)				
FORAGING (NO ACORNS)				
AMARANTH GREENS	44.00	0.410049	4.038240	18.042
CHENOPODIUM SEEDS	163.00	3.538363	616.575730	576.753
DEER	118.00	0.347419	0.999465	40.995
** Total **		4.295831	621.613435	635.790

Table 19. Continued.

RESOURCE	UNIT COST (hours/100 kg)	ACTIVITY (100 kg)	AVAILABLE (100 kg)	TOTAL COST (hours)
** THREE-ZONE SITE; SPRING II (MACA-000)				
POST-MAIZE (NO ACORNS OR SQUASH)				
AMARANTH GREENS	44.00	2.298642	4.038240	101.140
MAIZE	83.70	3.692821	1210.315315	309.089
** Total **		5.991463	1214.353555	410.229
** THREE-ZONE SITE; SUMMER (MACA-000)				
FORAGING (NO ACORNS)				
AMARANTH GREENS	44.00	0.216011	4.038240	9.504
BLACK CHERRY	60.00	13.080628	77.045000	784.837
BLUEBERRIES	65.00	0.406290	0.406290	26.408
CHENOPODIUM GREENS	44.00	0.840720	0.840720	36.991
DEER	96.00	0.439680	0.439680	42.209
DEER	160.00	0.918775	0.918775	147.004
GRAPE	28.00	0.494860	0.494860	13.856
TURKEY	216.00	0.364090	0.364090	78.643
** Total **		16.761054	84.547655	1139.455
** THREE-ZONE SITE; SUMMER II (MACA-000)				
POST-MAIZE (NO ACORNS OR SQUASH)				
AMARANTH GREENS	44.00	1.498595	4.038240	65.938
BLUEBERRIES	65.00	0.406290	0.406290	26.408
CHENOPODIUM GREENS	44.00	0.840720	0.840720	36.991
GRAPE	28.00	0.494860	0.494860	13.856
MAIZE	71.10	10.365631	1210.315315	736.996
TURKEY	216.00	0.364090	0.364090	78.643
** Total **		13.970186	1216.459515	958.834
** THREE-ZONE SITE; WINTER (MACA-000)				
FORAGING, POST-MAIZE (NO ACORNS OR SQUASH)				
BERRIES (RUBUS)	81.00	0.077050	0.077050	6.241
BLACK CHERRY	74.00	0.197442	77.045000	14.610
BLUEBERRIES	81.00	0.406290	0.406290	32.909
CHENOPODIUM SEEDS	163.00	3.921412	616.575730	639.190
DEER	90.00	0.468052	0.918775	42.124
HAWTHORN	81.00	0.077050	0.077050	6.241
WILD PLUM	46.00	1.078630	1.078630	49.616
** Total **		6.225926	696.178525	790.934

With the addition of maize to the list of available resources one sees a significant change in the optimal fall solutions compared to the previous models as the availability of fresh fish and pawpaws declines. The result is the addition of maize to the LP dietary solution in greater amounts as sites are located further and further from the river. In the case of MACA-93, the four-zone site furthest removed from the river, the diet is to be further augmented by hawthorns and dried berries.

The four-zone site optimal winter solution is the same for both foraging and post-maize modes of subsistence with a total reliance on wild resources (since squash has been omitted from the list of available resources). The recommended use of chenopodium seeds, deer, and hawthorn replicates the results of the previous two-season models, but with the current model's reduction in the seasonal availability of all storable resources and with the availability of stored summer resources, viburnum has been dropped as a staple and has been replaced with dried fruits: berries, black cherries, and wild plums.

There is also little change in the spring solutions between the three-season and two-season models when foraging is the basis of subsistence. The least cost solution (567.49 hours) is once again a combination of fresh fish and greens (amaranth is preferred, but chenopodium and/or poke will do almost equally well). As sites are located further away from the river and the availability of fresh fish is reduced, dried fish and chenopodium seeds are used

to round out the diet. The total cost of meeting the minimal nutritional needs of the household also rises with distance from the river.

In comparison with the earlier two-season models, it is with the introduction of stored maize to the list of available spring resources among the four-zone site three-season models, that the most significant change occurs in reaching an optimal solution. It is in the spring of the year that maize reaches its highest proportion in the optimal diet contributing as much as 61.1% of the total diet by weight in the cases of MACA-43 and MACA-137 where amaranth greens complete the rest of the diet. In the cases of MACA-171 and MACA-93 which are further removed from the bottomlands, the reduction in the availability of amaranth greens is the cause behind the addition of chenopodium and poke greens and chenopodium seeds to the solution diet.

Once again, there is little change in the summer three-season four-zone site solutions compared to the earlier two-season models. The least cost solution of fresh fish, fresh mussels, and greens (amaranth or chenopodium) of the preceding LP summer programs would have been repeated for both foraging and post-maize were in not for the reduction of the availability of these resources as a result of the implementation of the two season storage factors. Instead, for those sites nearest the river (MACA-43 and MACA-137) tubers are added to both the foraging and post-maize diets to make up for the now less available fresh fish. As one moves away from the river and its floodplain, the cost of living rises and additional food substitutes are once

again brought into play. For the foraging mode of subsistence models, these include blueberries, deer, and turkey for MACA-93 and bear and grapes for MACA-171. When maize is added to the list of available resources in the post-maize subsistence models, these two sites see the addition of maize as a significant portion of the overall summer diet (17.1% by weight for MACA-171 and 38.7% for MACA-93).

The fictitious three-zone site, MACA-000 was included in this second phase of LP analysis in order to help gauge the effect riverine resources have in the optimal solutions. For the fall, the MACA-000 solution for both foraging and post-maize subsistence modes relies most heavily (20.6%) on deer (both fresh and dried), chenopodium seeds (52.8%), pawpaws (7.7%), and wild plums (14.6%). Dried berries and hawthorns complete the optimal assemblage. In many ways this pattern resembles the winter pattern calculated for the four zone sites, the difference being a greater reliance on deer in the three-zone solution and the availability of the ever present fall resource, pawpaws. And, in fact, the winter solution for the three-zone problem was very nearly identical to the fall solution in both cost and selected resources, the major difference being the presence of pawpaws in the fall solution and the use of black cherries in the winter solution.

The spring MACA-000 foraging model solution consisted of three resources: amaranth greens (9.5% by weight), chenopodium seeds (82.4%), and deer (8.1%). Compared to MACA-93, the four-zone site which most resembles

the three-zone model, besides the replacement of fish with deer, the most notable change in solutions is a significant increase in the use of stored chenopodium seeds (from 43.3% to 82.4%). There is also a significant change in the total cost, from 375.78 hours in the MACA-93 solution to 635.79 hours in the MACA-000 solution.

With the inclusion of maize as a potential resource in the MACA-000 spring post-maize solution, there is a dramatic drop (35%) in the total subsistence effort (falling to 410.23 hours) as amaranth and stored maize are selected as the food combination of least cost. This is the same post-maize spring solution (variation IIIa) obtained for the near river four-zone sites, MACA-43 and MACA-137.

In comparison to the four-zone and three-zone models, summarizing the results of the two-zone site analyses is simple. With the loss of acorns as a potential food source, all seasons, even the fall and winter occupations are infeasible due to insufficient calcium. This is why the two-zone site results have been omitted from Table 19. Those persons wishing to know what length of occupation would be supported by the catchment areas surrounding MACA-37, MACA-65, and MACA-89 will be interested to learn that if every available resource within each catchment area were consumed, the maximum length of occupation for seven persons that meets the minimum nutritional requirement of .86 g of calcium per day is 33 days.

Summarizing the Three-season LP Results

In general, the three-season LP models probably more closely resemble the patterns of behavior exhibited in the archaeological record for the upper Green River drainage as a whole than do the two-season models by virtue of their inclusion of resources stored from the previous two seasons. This is not to say that the three-season models do not have their own inadequacies and over simplifications. The author is keenly aware of the shortcomings of the three-season LP models, particularly the manner in which fresh resources are assumed to be available for consumption for the full 90 days of site occupation. This was clearly not the case in the past, and the simple way in which resource availability has been modeled, has clearly compromised to some degree the results of the LP programs.

For example, pawpaws are a key ingredient in all of the fall resource mixes generated in the initial LP analyses because of their low acquisition cost (12 hrs/100 kg of edible fruit) and relatively high levels of ascorbic acid. But, the fruit of the pawpaw quickly become putrid after ripening (Reidhead 1981:178), so although the LP models identify pawpaws as an optimum resource on the basis of low cost and nutritional content, in reality pawpaws could not be consumed for the full 90 days stipulated in the LP models. Pawpaws generally ripen sometime in September to October (U.S. Forest Service 1948:92), which means that to more closely reflect reality, pawpaws

should be excluded from the dietary model for the last 60 days of the fall model if a more accurate picture of the dietary alternatives is to be constructed.

There is also the problem of not having included the full spectrum of available faunal and floral resources in the various LP models, resources such as strawberries, marshelder, maygrass, woodchucks, canines, and others. This was a result of several factors, not the least of which was lack of sufficient data concerning the availability and production costs of these potential resources. Despite these obvious deficiencies, the three-season models exhibit patterns of resource selection which are useful in the attempt to understand the factors affecting resource exploitation and site selection which occurred in the past. This was, after all the purpose of this exercise, not the formulation of "correct" LP models.

Again, the three-season models show that sites located away from the river should predominantly be fall/winter sites. In conjunction with the two-season models, they demonstrate that the spring and summer resources are too short in supply in the upland areas to support households for any but the briefest amount of time. But even in the fall of the year, when upland resources are at their most abundant, subsistence on upland resources alone would not be possible for more than a month if acorns were excluded from the diet. Thus, both the two-season and the three-season models demonstrate that the preferred site location in the fall should be a site where all four topographic zones can be most easily exploited.

The autumn four-zone site models show a strong reliance on fish, deer, and mussels as the primary faunal resources when all four resource zones are exploitable. The most selected floral resources are pawpaws, followed by wild plums, hawthorns, hickory nuts, blueberries, raspberries/blackberries (*Rubus* sp.), and maize. The same resources are targeted in the hypothetical three-zone MACA-000 solution.

The winter models for the four-zone sites are essentially the same as those obtained for the fall except for the exclusion of the no longer available riverine resources: mussels and fish. The major difference is the addition of stored chenopodium seeds as a major food source. For all four-zone sites, including both foraging and post-maize subsistence modes, chenopodium seeds are to make up over 60% of the total optimum diet by weight. In the hypothetical three-zone site model, chenopodium seeds are slated to represent 53% of the total diet. Obviously, the models would suggest that chenopodium seeds would be at their most valuable in the form of a stored resource consumed during these lean months of the year.

Turning to the spring and summer models, once again one finds support for the major proposition that floodplain and river resources are the primary resources to be exploited during these months of the year. The spring solutions among the four-zone foraging models consistently target two riverine and floodplain resources, fish and greens, as the two most economical resources at this time of year despite the higher costs attributed to spring fishing in this

second phase of LP models. When amaranth greens cannot be exploited to the maximum potential, the other greens (chenopodium and poke) are substituted at very little additional cost. When fish resources are limited (e.g., MACA-171 and MACA-93), or omitted (MACA-000), stored fish, deer, and chenopodium seeds are to be added to the foraging diet.

When stored maize is added to the list of available resources in the spring, the result among the four-zone sites is the abandonment of fish as a primary resource and the adoption of stored maize in its stead. Where the availability of stored maize is not a problem, it assumes the greatest portion of the spring diet in the three-season models. Where maize resources are limited, chenopodium seeds are once again targeted as a preferred resource.

In somewhat of an about face compared to spring, the three-season LP models show that fish are to be preferred over amaranth and maize as summer resources as a result of the lower cost of harvesting fish at this time of year. During this time of year, fish, mussels, tubers, and greens are expected to be staples in the diet. If fish is limited in the models for some reason, then the most commonly chosen economical alternatives that provide the minimum nutritional requirements consist of combinations of blueberries, deer, turkey, and grapes. Maize is a significant addition to the optimal solution in the post-maize subsistence models for sites where fish resources are limited (i.e., MACA-93 and MACA-171).

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COMPARING THE LP RESULTS WITH THE ARCHAEOLOGICAL DATA

Introduction

The following section compares the results obtained from the two-season and three-season LP models with the archaeological records exhibited at each of the seven sites selected for analysis. The purpose of this exercise is to point out where the linear programming models do or do not predict the patterns observed in the archaeological record. Where the LP models fail to predict the archaeological record, possible reasons for the inconsistencies will be explored. Where there appears to be some correspondence between the models and the archaeological record, it will be inferred that the reason for the similarities is the result of past Green River peoples having behaved in a rational and somewhat predictable manner with regard to subsistence practices and site selection.

MACA-37 Blue Spring Hollow Rockshelter (15Ed52)

Blue Spring Hollow Rockshelter is probably first mentioned in the archaeological literature as Unsurveyed Site Location 19, a "cliff shelter" that was reported by Schwartz (1958d:23) in the same approximate area,

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apparently on the basis of informant information. But one cannot be sure it is the same site because there is no description of Site Location 19 in any of Schwartz's reports other than the remark that the site had been visited during Sloan and Schwartz's survey of the Park with no artifacts having been recovered (Sloan and Schwartz 1960:31).

The existence of Blue Spring Hollow Rockshelter was later reported and tested (Carstens 1974; Watson and Carstens 1975; Carstens 1980) as part of the Green River Survey Project. The site is unique it that it remains the only rockshelter in the Park in which more than six m^2 units have been excavated using modern excavation techniques. Excavations at the site encompassed a total of 22.5 m^2, and resulted in an invaluable glimpse into the types of activities that occurred during the Late Woodland and incipient Mississippian periods at medium sized rockshelters such as this one. Watson and Carstens' overview of the excavations at the site reveals the contribution which this site has made toward a better understanding of Late Woodland and incipient Mississippian people's lifeways in the upper Green River drainage:

> The two major cultural occupations inhabiting Blue Spring Hollow are characterized by diagnostic artifacts that date between A.D. 800 to 1100 and A.D. 900 to 1300. These different occupations are identified as Horizon I (Late Woodland) and Horizon II (Mississippian), respectively. . . .The economic-subsistence pursuits of the Horizon I occupation is characterized by Late Woodland deer and hickory nut procurement and processing. Male and female occupants participated in these activities, although various strands of evidence suggest that work tasks and work areas were divided by sex (Figure Sixteen). The use of this rockshelter by the Late Woodland cultural group

> appears to have been pre-determined and characteristic of a small extended or large nuclear family.
>
> The economic-subsistence pursuits of the Horizon II, Mississippian occupation, is focally oriented toward deer procurement and processing. Evidence located during the excavation of this horizon suggest that the majority of the Mississippian inhabitants were males. Deer meat, processed at the site, was then taken from this site to a winter base-camp and/or village. The proximity and similarity of work areas within this shelter's occupation suggest also that the procurement and processing of animal meat was probably accomplished by socially related (kin and/or clan) members.
>
> Additional evidence suggests that both social groups (Late Woodland and Mississippian) inhabited the rockshelter sometime during the mid- to late-fall season (October-November). The Horizon I occupation, however, may have lasted for several months. The Horizon II occupation did not last for more than probably two or three weeks [Watson and Carstens 1982:69-71].

Carstens' excavations at Blue Spring Hollow Rockshelter revealed a Late Woodland (Horizon I) occupation which consisted of hearths, storage pits, postmolds, the usual range of chert tools and debris, a ceramic assemblage dominated by Rough River Cordmarked and Rough River Smoothed Over Cordmarked (54.8%) and Rough River Plain (38.1%) ceramics, milling or "lap" stones, and a burial pit containing an adult female. Eight of the milling stones came from the burial pit.

In comparison, the Mississippian occupation exhibited none of the features listed for Horizon I, with the remains of the occupation generally limited to a shallow midden covering the upper ten cm of the site. The lack of subsurface features would appear to indicate, as Watson and Carstens

relate, that the Mississippian presence was much shorter in duration than the Late Woodland occupation.

The time span separating the two Horizons was probably not very great. An uncorrected radiocarbon date of A.D. 1130+/-80 (UGA 1838) was obtained from charred wood and hickory nut fragments found in the Horizon I burial pit (Carstens 1980:170). No radiocarbon assay was made of Horizon II, but the ceramic assemblage suggests an early Mississippian occupation roughly coeval with the Dry Creek site (described below) which has been firmly dated to A.D. 900-1000 on the basis of three (uncorrected) radiocarbon dates. The ceramic assemblage in Horizon II consists of a mixture of Late Woodland and early Mississippian types principally composed of McKee Island Cord Marked (13.5%), Bell Plain (2.6%), Rough River Cordmarked and Smoothed Over Cordmarked (39.4%), Rough River Plain (25.8%), and Baytown Plain (11.6%).

As Carstens (1980:166) notes, the total ceramic assemblage (126 sherds in Horizon I, 155 in Horizon II) at Blue Spring Hollow Rockshelter is small given the total area (22.5 m^2) excavated at the site. In comparison, Patch Rockshelter, with only four one meter square excavation units, produced 60 sherds. The low frequency of sherds at the site may reflect the location of the site, or the relatively short duration of occupation, or perhaps other factors which will be discussed later.

A more protracted occupation during Horizon I is also indicated by the presence of a higher percentage of primary and secondary decortification

flakes, but a greater number of chert flakes and chert tools occurs in Horizon II. Projectile points and fragments are more than twice as frequent (N=66) in Horizon II than in Horizon I (N=27) suggesting a greater emphasis on hunting during the Mississippian occupation. Bifaces and unifaces form a greater percentage of the Horizon I assemblage than they do in Horizon II.

Wagner's (1978) analysis of the floral materials associated with the Late Woodland occupation (Horizon I) at Blue Spring Hollow Rockshelter reveals the presence of hickories, walnuts, acorns, several legumes including wild bean (*Strophostyles* sp.), one chickweed/spurry (Caryophyllaceae) seed, one blueberry (*Vaccinium* sp.) seed, and six possible chenopodium seeds. The Mississippian component produced only hickories and carbonized wood. The presence of hickory husks in Mississippian and Late Woodland deposits indicates hulling of the nuts occurred at the site during both periods. The pound and boil method of processing the nuts appears to have been practiced. Comparing hickory to wood by weight, Horizon I (Late Woodland) contains 64% hickory and 36% wood while Horizon II (Mississippian) contains 15% hickory and 85% wood. Wagner (1978:40) and Carstens (1980:177) both suggest that the change in these proportions indicates a reduction in the emphasis placed on nuts during the Mississippian period and a greater emphasis on faunal resources. Wagner (1978:39) also postulated that the "wide variety of seeds indicates that these were not gathered intentionally for food, but rather were accidental inclusions in the fire area." She concludes that there was no evidence of food

storage (Wagner 1978:39) (although there were several storage pit features within Horizon I) and no evidence of spring or summer foods. The exclusive presence of late-summer and autumn foods indicates occupations sometime between August and November (Wagner 1978:39). Deer tooth eruption patterns and immature deer bones recovered from the site support this conclusion.

Carstens' (1980:152) interpretation of the Mississippian occupation as one of a "male-dominated" occupation, lends itself to the hypothesis that the Horizon II occupants represented a predominantly, perhaps solely male hunting party whose primary purpose was hunting. Is it possible that the Blue Spring Hollow Mississippian occupation reflects an increase in production scale in which males from several households have cooperated in a more specialized hunting effort.

This hypothesis appears supported by the lack of any domestic features that would suggest any form of extended occupation of the site when compared to the earlier Late Woodland Horizon I. It also appears supported by the differences in tool types with a greater proportion of projectile points and relatively fewer bifaces and unifaces and no milling (nutting) stones occurring in Horizon II. It is also supported by the lower proportions of hickory nuts in the floral assemblage. There does not appear to be, however, any significant differences in the relative proportions of different species that were exploited between the Late Woodland and Mississippian occupations.

The Horizon II vertebrate assemblage consisted of the following species by count: box turtle (7.9%), painted turtle (3.7%), turtle (11.1%), deer (63.7%), elk (0.2%), bear (1.3%), raccoon (0.3%), squirrel (0.5%), rabbit (0.4%), dog (0.2%), and turkey (10.8%). A few (21) freshwater mussel shell fragments and two aquatic gastropods were also recovered from Horizon II. The earlier Horizon I assemblage also contained a nearly identical number (22) of freshwater mussel fragments and two aquatic gastropod shells. The Horizon I assemblage also contained similar proportions of vertebrate species: box turtle (8.6%), soft-shell turtle (0.4%), painted turtle (5.5%), turtle (6.7%), deer (68.5%), bear (1.3%), raccoon (0.8%), dog (0.3%), and turkey (7.7%).

If Horizon II represents a "specialized" use of the site by males for the purpose of obtaining animal resources for consumption elsewhere as Carstens proposes, then there does not appear to be a concerted effort to exploit a specific or limited range of resources. The evidence, for example, does not appear to reveal a greater emphasis on deer hunting, which one would immediately think of when discussing special purpose hunting parties in the eastern Woodlands. It may be as Carstens (1980:174) suggests, that the deer resources were being butchered on site with the meat transported back to the main camp for consumption. The rest of the floral and faunal assemblage could then represent the meals of the hunting party while involved in the endeavor.

Alternatively, it may be suggested that the similarities in faunal assemblages exhibited between the two horizons indicates that the hunting strategies pursued by individual households did not vary significantly from "specialized" hunting parties. This is the more likely of the two hypotheses. By exploiting a wide range of faunal resources it appears that the postulated groups of Mississippian males who occupied the site probably hunted as individuals and did not work collectively in organized hunting drives, a method of communal hunting noted often in the ethnohistoric literature (Swanton 1946:317-320). If this is the case, there is no real increase in the scale of production represented at Blue Spring Hollow during the Mississippian occupation. Rather than acting in concert to increase the efficiency of hunting, the Mississippian males who occupied the site may have found it advantageous to hunt faunal resources in groups for purposes of security or out of the desire for male companionship.

Comparing the faunal and floral assemblages found at Blue Spring Hollow Rockshelter with the results of the LP analysis (Table 20), one finds a number of similarities and some differences. The two-season models for fall and winter, indicate that primary resources found at the site should consist of acorns, pawpaws, and viburnums in the fall; acorns, deer, and viburnums are to be consumed in the winter. The three-season models for MACA-37, which excluded acorns from the list of available resources on the grounds of taste preferences, produced infeasible solutions due to insufficient calcium.

Table 20. Comparing the MACA-37 Archaeological Data to the LP Results.

	RESOURCE AMOUNTS (*100 KG) PREDICTED BY THE VARIOUS LP MODELS							
	MACA-37 2-SEASON FALL	MACA-37 2-SEASON WINTER	MACA-93 2-SEASON FALL	MACA-93 2-SEASON WINTER IIB	MACA-93 3-SEASON FALL IB	MACA-93 3-SEASON WINTER	MACA-000 3-SEASON FALL	MACA-000 3-SEASON WINTER
RESOURCES OBSERVED								
ACORNS	9.37	10.22	-----	-----	-----	-----	-----	-----
BLUEBERRIES	-----	-----	-----	-----	0.17	0.24	0.16	0.41
HICKORY	-----	-----	-----	-----	0.44	-----	-----	-----
CHENOPODIUM SEEDS	-----	-----	-----	2.77	-----	3.91	3.89	3.92
DEER	-----	0.23	1.20	-----	2.55	0.74	1.52	0.47
MUSSEL	-----	-----	0.56	-----	0.62	-----	-----	-----
OPOSSUM	-----	-----	-----	0.01	-----	-----	-----	-----
NOT OBSERVED								
VIBURNUM	2.39	2.25	-----	0.59	-----	-----	-----	-----
SQUASH	-----	-----	-----	1.44	-----	-----	-----	-----
PAWPAW	4.60	-----	3.81	-----	0.34	-----	0.57	-----
WILD PLUM	-----	-----	-----	-----	0.18	0.19	1.08	1.08
HAWTHORN	-----	-----	-----	0.01	0.01	0.01	0.08	0.08
BERRIES	-----	-----	-----	-----	-----	0.01	0.08	0.08
BLACK CHERRY	-----	-----	-----	-----	-----	1.14	-----	0.20
FISH	-----	-----	4.70	-----	2.27	-----	-----	-----
PRESENT BUT NOT PREDICTED								
WALNUT	BEAR							
RACCOON	TURKEY							
SQUIRREL	BOX TURTLES							
RABBIT	AQUATIC TURTLES							
DOG*	ELK*							
LEGUMES*								

* DENOTES A RESOURCE NOT INCLUDED IN THE LP PROGRAM MODELS.

But the three-season LP results (variation Fall IB) for MACA-93, the site located furthest from the river among the four-zone sites, suggest that an economical solution for a fall occupation at MACA-37 utilizing resources from the uplands and bluffline zones would include dried blueberries (upland), deer (upland), hickory nuts (upland), and pawpaws (bluffline). If resources from the floodplain and river were included within the catchment area, then fish, mussels, hawthorns, and wild plums could be expected as well. Likewise, the autumn solution for the fictitious three-zone site, MACA-000, holds some indication of what would appear to be reasonable expectations regarding the sorts of resources one would find at MACA-37 in the fall. The optimal fall solution for MACA-000 for both foraging and post-maize subsistence modes consisted of dried berries (including blueberries), chenopodium seeds, deer, hawthorns, pawpaws, and wild plums.

The correspondence between archaeological reality at Blue Spring Hollow Rockshelter with the various LP models is not perfect, but does bear enough resemblance to suggest that some of the basic assumptions included in the models are supported by the archaeological evidence. Besides the fact that the site appears to be occupied exclusively in the fall during both Horizon I and Horizon II periods, there does appear to be the consumption of the LP selected resources, hickories, acorns, chenopodium seeds, blueberries, and deer, during the Late Woodland occupation of the site. This instance of occupation is interpreted as having consisted of a single family group, i.e. a household,

who probably resided at the site sometime between August and December. The lack of pawpaws at the site suggests that the site was occupied sometime after pawpaws were no longer available, sometime after September or October. If this is the case, then the food resources exhibited within Horizon I appear to be a mixture of stored summer foods (blueberries and chenopodium seeds) and autumn resources (acorns, hickories, walnuts, deer, turkey, turtles, bear, and raccoon). The majority of these fall resources are found in the uplands, a zone for which the site is best suited to exploit from the perspective of minimizing food production efforts. Even some of the aquatic turtles, a resource normally associated with the Green River, may have been obtained from the uplands, in particular from small ponds which occasionally occur on the larger upland ridges, and from deeper pools of water within the upland stream systems. The presence of freshwater mussels in the faunal assemblage indicates that the occupants of MACA-37 did extend their procurement efforts to include the major riverine areas. This is the only possible source for the freshwater mussels and gastropods found at the site. It should be noted, however, that Carstens (1980:176) indicates that the gastropods had been fashioned into beads, so they are really not germane to the current discussion regarding faunal exploitation at the site. The mussels, however, probably were carried to the site to be consumed as food. On the other hand, as Carstens (1980:176) notes, they could not have been the focus of much planned exploitation or contributed much to the diet given their limited numbers.

MACA-43 Patch Rockshelter (15Ed42)

Patch Rockshelter was first reported in the archaeological literature by Watson and Carstens (1975). Their initial description of the site is as follows:

> GRS-18 Patch Rockshelter. Small cave located on south side of Green River and west of old Turnhole Bend Ferry on high terrace, circa 60 meters above river. Site faces 50 degrees east of magnetic north. Surface debris included shell pendant, several large chert cores, flakes and small broken triangular projectile point. Shelter is 14.30 meters wide, 5.60 meters long, and has a maximum ceiling height of 2.5 meters [Watson and Carstens 1975: Appendix A, Part 2, Page 3].

Carstens conducted limited excavations at the site during July and November of 1975, opening four one-meter square units. He was able to identify two major periods of occupation (Horizon I and Horizon II) and six distinct stratigraphic units (Carstens 1980:112-113). Based on the recovery of a Lowe Cluster point (Justice 1987:208-214) and 60 pottery fragments assigned to the ceramic types: Mulberry Creek Plain, Wright Check Stamped, Rough River Cordmarked, Rough River Simple Stamped, and Rough River Plain from Horizon II and a "Merom-like" point and no ceramics from Horizon I, Carstens (1980:114-115) dated the two major periods of occupation(s) at the site to the transitional Middle/Late Woodland and the Late Archaic periods, respectively.

The lithic tool assemblages at MACA-43 show marked differences between the two horizons. Horizon I contained only 3% cortical flakes compared to 24% for Horizon II. Horizon II contained greater numbers of flakes and cores than Horizon I. Horizon II also contained greater numbers

of unifacial and bifacial tools, especially projectile points. The evidence suggests, therefore, that Horizon II represents an occupation(s) of longer duration than Horizon I. This assessment would appear to be supported by the presence of pottery in relative abundance within Horizon II and a slightly greater diversity in the animal species represented in the Horizon II collections.

Animal remains recovered from Horizon I consisted of: deer (73 elements), wild turkey (49), turtle (5), black bear (1), mouse (1), and small fish (quantity unknown). The faunal species obtained from Horizon II were deer (192), turkey (31), raccoon (2), box turtle (3), turtle (2), king snake (1), water snake (2), dog (2), and mouse (2). Within the Horizon I faunal assemblage, excluding fish and mice, deer elements constitute 57% of the vertebrates by count, wild turkey 38%, turtle 4%, and black bear 1%. Again, excluding mouse remains as probable natural inclusions, Horizon II consists of 82% deer, 13% turkey, 1% raccoon, 1% box turtle, 1% turtle, 1% snake, and 1% dog by count. Deer tooth eruption patterns exhibited at the site indicate late fall exploitation of the resource. A slight selection for the hind-quarter area of deer was also noted for both horizons by Carstens (1980:123).

In addition to the vertebrate remains, over 100 freshwater mussel shells and nearly 700 aquatic gastropod shells were collected in the excavations at the Patch site. The majority of the gastropods came from Horizon I, while the mussels were distributed throughout all horizons.

Floral remains were relatively scant within all levels of the Patch Rockshelter excavations, but of the floral remains that were recovered, they were dominated by hickory nuts with two fragments of walnut recovered from Horizon I and one persimmon seed from Horizon II (Wagner 1978:56-57). Hickory hulls were not present in the assemblage suggesting that removal of the hulls was done elsewhere. The pound and boil method of nut processing appears to have been practiced. All of the plant food remains are available from September through November (Wagner 1978:58), suggesting that sometime between late summer and early winter was the time of year in which the site was occupied.

Located on a bluffline terrace overlooking the Green River, Patch Rockshelter is somewhat unique compared to the other six sites included in the sample in that it represents a rockshelter site located immediately adjacent to the river. The LP models indicate that given the proximity of the site to the river and the floodplain, there should be a greater reliance on riverine resources compared to the two-zone sites, like Blue Spring Hollow, regardless of the mode of subsistence pursued by the site occupants. This is, indeed, the case with fish, freshwater mussels, and aquatic gastropods present within the faunal assemblage.

Despite the limited nature of the excavated sample at Patch Rockshelter, the resources present in the assemblage come close to resembling the LP models (Table 21). The three-season and two-season foraging (and post-maize)

Table 21. Comparing the MACA-43 Archaeological Data to the LP Results.

	RESOURCE AMOUNTS (*100 KG) PREDICTED BY THE VARIOUS LP MODELS				
	MACA-43 2-SEASON FALL	MACA-43 2-SEASON WINTER	MACA-43 3-SEASON FALL IA	MACA-43 3-SEASON WINTER	MACA-93 3-SEASON FALL IB
RESOURCES OBSERVED					
ACORNS	-----	-----	-----	-----	-----
HICKORY	-----	-----	-----	-----	0.44
DEER	1.24	0.30	1.98	0.56	2.55
MUSSEL	0.56	-----	0.57	-----	0.62
FISH	4.73	-----	5.33	-----	2.27
NOT OBSERVED					
PAWPAW	3.64	-----	0.36	-----	0.34
VIBURNUM	-----	1.89	-----	-----	-----
BLUEBERRIES	-----	-----	-----	0.26	0.17
WILD PLUM	-----	-----	-----	0.76	0.18
HAWTHORN	-----	0.05	-----	0.05	0.01
BERRIES	-----	-----	-----	0.05	-----
BLACK CHERRY	-----	-----	-----	0.72	-----
CHENOPODIUM SEEDS	-----	3.72	-----	3.90	-----

PRESENT BUT NOT PREDICTED	
WALNUT	RACCOON
BEAR	DOG*
TURKEY	PERSIMMON*
BOX TURTLE	SNAKE*
OTHER TURTLES	AQUATIC GASTROPOD*

* DENOTES A RESOURCE NOT INCLUDED IN THE LP PROGRAM MODELS.

fall models for MACA-43 indicate that a diet that consists of deer, fish, mussel and pawpaw would be optimal for this site in autumn. Given the apparent absence of pawpaws at the site, it appears reasonable to assume that the site was occupied sometime after this potential resource had ripened in September or October. Alternatively, the absence of pawpaw seeds may be a result of differential preservation or it may simply be a result of the sampling process. These factors could also explain the relative paucity of other floral remains, particularly hickory nuts, at the site. It may also explain the apparently low occurrence of fish remains in the collection.

MACA-65 Jagger Ridge Rockshelter (15Ed69)

Jagger Ridge Rockshelter was first reported by Watson and Carstens following their survey of the areas around the Wet Prong-Collie Ridge Trail system (Watson and Carstens 1982:71-72). The site was revisited on Feb. 23, 1989 by the MCNPAIP crew while trying to confirm the location of nearby Wildcat Hollow Rockshelter. When the crew arrived at the site, they found the medium sized shelter heavily impacted by looters digging for artifacts. Approximately 50% of the site had been dug to a depth of 20-30 cm, primarily along the backwalls of the shelter. An abundance of lithic, ceramic, and faunal material was found on the surfaces of the looter's backdirt piles and scattered about the shelter. These artifacts were gathered as a general surface collection and included the following identifiable projectile point types: Dalton, Big

Sandy, Snyders, Late Archaic Stemmed Cluster, Gary Contracting Stemmed, Copena Triangular, Dickson Cluster, Little Bear Creek, Merom Cluster, and Benton Stemmed. Ceramic artifacts surface collected from the site included: Mulberry Creek Cordmarked, Baytown Plain, Kennett Plain, Rough River Smoothed Over Cordmarked *var. Blowing Spring*, Rough River Cordmarked, Plum Springs Cordmarked *var. Plum Springs*, Plum Springs Cordmarked *var. Green River*, Plum Springs Plain, Blue Lake Cordmarked, Mississippi Plain, Bell Plain, McKee Island Cordmarked, McKee Island Smoothed Over Cordmarked *var. Wet Prong*, McKee Island Cordmarked *var. Temple Hill*, and Mississippi Plain *var. Waxwing* (Prentice 1990b).

The artifacts recovered from the surface of MACA-65 indicated that a very long sequence of prehistoric occupation was possibly present below the ground surface. To test this possibility, it was decided to excavate two test units at the site. Both test units were placed inside the dripline. Test Unit #1 was placed in the center of the rockshelter, while Test Unit #2 was located along the backwall on the eastern end of the site. Both units were dug in arbitrary 10 cm levels. Test Unit #1 was dug to a depth of approximately one meter (ten levels) before wet ground conditions forced abandonment of this unit. Test Unit #2 was excavated to a depth of approximately 60 cm (six levels) before the unit was abandoned due to lack of time.

Excavations in Test Unit #1 revealed at least eight major horizontal depositional units, a possible hearth, and a possible pit feature. The upper

most horizontal unit, Zone A, was the most recent and has been highly disturbed by recent looting activity. Excavation Levels 1 and 2 roughly corresponded with this zone. At the base of Zone A was a lens of burned soil that might represent a hearth area. Below Zone A and this burned soil lens lay the second major horizontal unit, Zone B. Excavation Levels 3 through 5 were contained within this zone. A radiocarbon determination from Level 5 would place the beginning date of this deposit at roughly 3200 B.C. Below Zone B was a somewhat thinner horizontal deposit, Zone C. Excavation Level 6 roughly corresponded with this zone. The stratigraphy below Zone C was slightly more complex in that a possible pit feature (Zone D) appeared in the western half of the unit and appeared to truncate the natural horizontal layers of Zone E which actually consist of alternating horizontal layers of burned and unburned soils. The burned layers within Zone E were three in number and were divided by two unburned layers. Excavation levels 7 through 10 contained materials from Zones D and E.

After the stratigraphy had been defined in the profile wall of Unit 1, a 30 cm by 30 cm column sample was removed by natural levels along the western end of the south profile wall. These samples were then subjected to flotation in order to provide floral samples for analysis. During the removal of the column sample, a large piece of wood charcoal was encountered in Zone D. A piece of this wood was collected and submitted for radiocarbon assay. The resulting uncorrected date was 6400 +/- 90 B.P. (4450 +/- 90 B.C.). Some

worked bone artifacts were also recovered from the column samples. Two of the bone pieces appeared to be fragments of bone pins. The two other pieces were bone awls.

Based on the stratigraphy, artifactual materials, and radiocarbon dates, it would appear that the alternating burned and unburned soil layers of Zone E were deposited during the Middle Archaic period sometime before 4450 B.C. A pit feature was then excavated by the prehistoric occupants of the site sometime around 4450 B.C. which cut through the earlier deposits. Two Big Sandy II points and a Dickson Cluster point were recovered from within Zones D and E. The presence of Big Sandy II points is in accordance with a deposit of this age (Middle Archaic). The Early Woodland Dickson Cluster point is probably an intrusive artifact that was displaced downward in one of the several rodent burrows noted during the excavation of the test unit. Sometime later, the Middle Archaic pit was then refilled and another depositional event occurred, resulting in Zone C. This was followed by a larger depositional event, Zone B, which may span the terminal Middle Archaic to incipient Woodland periods. This conclusion is based on the near absence of ceramics for all but the upper level and the C-14 date of 3225 B.C. from the lower portion of this zone. It is entirely possible, however, that the Zone B deposit postdates the Early Woodland period and that the radiocarbon determination obtained from the lowest level of Zone B is the result of mixing earlier carbonized plant materials into this level. The mixing of artifactual debris is

evidenced in other levels by the recovery of a Kirk Serrated point in Level 4 and a Kirk Corner Notched Cluster point in Level 7.

Test Unit 1 Levels 1 and 2 represent the upper portion of Zone A. This is a recently disturbed zone. Consequently, a detailed description of the material collected has been omitted here.

Levels 3 through 5 roughly correspond with the intact depositional unit given the designation Zone B. Zone B appears to be a predominantly Late Archaic deposit with a minor amount of Woodland material recovered from Level 3. An apparent hearth area was evidenced at the top of Zone B by a fire reddened lens of soil. All of the soil from Level 4 was saved and subjected to flotation, and will therefore be described separately from the other two levels.

Levels 3 and 5 produced the following chert artifacts: two projectile points, one biface, four utilized chert flakes, 331 unutilized flakes, and six pieces of chert debitage. One of the projectile points from Level 3 was identified as a Madison type; the other point was too fragmentary to assign to type. Other lithic materials included part of a limestone pestle, three unutilized limestone flakes, 1187 pieces of burned sandstone, ten pieces of slate, and 27 pieces of limestone rough rock.

Faunal materials from Levels 3 and 5 included the following: bear (1), deer (10, including a deer antler tool), bobcat (1), box turtle (1), large mammal (60), medium mammal (2), indeterminate mammal (62), bird (3), bird eggshell (34), indeterminate animal (383), indeterminate snake (13), turtle (24), lizard

(1), indeterminate reptile (1), mouse or vole (Cricetidae) (1), mud or musk turtle (Kinosternidae) (1), indeterminate turtle (6), squirrel (1), one chipmunk or flying squirrel (Sciuridae) bone, freshwater mussel (46), aquatic gastropod (85), and 167 terrestrial gastropod shells.

Ceramic materials included two rock tempered sherds (one Plum Springs Plain, one with eroded surfaces), and one sand tempered Kennett Plain sherd collected from Level 3. Other materials recovered from both levels included seven pieces of daub, hickory (*Carya* sp.) nutshell, and wood charcoal.

One large hickory nutshell collected from Level 5 was submitted for radiocarbon assay to Beta Analytic in Coral Gables, Florida. The sample (Beta-31383, ETH-5423) was chemically pretreated by Beta Analytic then sent to Eidgenossische Technische Hochschule (ETH) in Zurich for radiocarbon dating using the Accelerator Mass Spectrometry (AMS) technique. The resulting uncorrected date was 5175 +/- 70 B.P. (3225 +/- 70 B.C.).

Level 4 (30-40 cm) represents the middle portion of Zone B. All of the soil excavated within Level 4 was subjected to flotation, which is the reason why it has been treated separately here from Levels 3 and 5.

Level 4 produced the following chert items: three projectile points, one hammerstone, 520 unutilized flakes, one utilized flake, and eight pieces of shatter. One of the projectile points was identified as a Kirk Serrated point; the other was assigned to the Late Woodland/Mississippian Triangular cluster. The third point was too fragmentary to type.

The faunal assemblage from Level 4 included: deer (17), rabbit (6), raccoon (1), squirrel (6), flying squirrel (1), chipmunk or flying squirrel (Sciuridae) (5), porcupine (1), frog (2), gar (*Lepisosteus* sp.) (1), crayfish (17), one probable groundhog (*Marmota monax*) (1), large mammal (76), mammal (13), small mammal (7), indeterminate bird (1), bird eggshell fragments (19), animal (881), fish (3), indeterminate snake (8), turtle (33), freshwater mussel (60), aquatic gastropod (137), and terrestrial gastropod (485). One human bone was also recovered from this level.

Floral materials from this level included: hickory (*Carya* sp.) nutshell, hazelnut (*Corylus americana*) nutshell, black walnut (*Juglans nigra*) nutshell, acorn (*Quercus* sp.) nutshell, acorn meat, and wood charcoal. Other materials collected during the excavation of Level 4 included: 17 pieces of burned daub, burned clay, four unutilized limestone flakes, one piece of limestone rough rock, and 77 pieces of burned sandstone. No ceramic materials were collected from this level.

Level 6 roughly corresponded with the horizontal depositional unit that was given the designation Zone C. Excavation of this level produced the following chert artifacts: one core, 23 unutilized flakes, and one utilized flake. Other lithic materials included two unutilized limestone flakes, 30 pieces of limestone rough rock, and 825 pieces of burned sandstone. Faunal materials included three deer bones, 38 indeterminate large mammal bones, one indeterminate bird bone, two indeterminate turtle bones, one squirrel bone,

one probable gray fox bone, 15 indeterminate animal bones, 14 terrestrial gastropod shells, 47 aquatic gastropod (*Elimia* sp.) shells, and 49 freshwater mussel shells. The remaining collected materials consisted of four pieces of burned daub, hickory (*Carya* sp.) nutshell, black walnut (*Juglans nigra*) nutshell, some unidentified floral remains, and wood charcoal.

Level 7 (60-70 cm) represents a combination of several stratigraphic zones. The lower portion of Zone C, the upper portion of Zone D (a possible pit), and the upper portion of Zone E (a series of alternating burned and unburned strata). Level 7 produced one projectile point and five unutilized chert flakes. The point collected from Level 7 was identified as a Early Archaic Kirk Corner Notched Cluster point. Faunal materials collected from the level included one terrestrial gastropod shell, ten aquatic gastropod shells, six mussel shells, two deer bones, one turkey bone, eight indeterminate large mammal bones, five indeterminate animal bones, and one indeterminate bird bone. The rest of the level's assemblage consisted of burned clay.

Levels 8 through 10 represents a mixing of two major stratigraphic units, Zone D (a possible Middle Archaic pit) and Zone E (alternating burned and unburned soil zones), which also appears to be predominantly Middle Archaic. Excavation of the three levels produced the following chert artifacts: four projectile points, 61 unutilized flakes, three utilized flakes, and three pieces of shatter/debitage. One of the projectile points was identified as a Big Sandy II type; one was identified as a Dickson Cluster type; one was identified

as a Large Side Notched Cluster point, probably a Big Sandy II. The other projectile point was too fragmentary to assign to type. Other lithic materials included one unutilized limestone flake, seven pieces of burned sandstone, and 35 pieces of limestone.

Faunal elements collected from the three levels included: deer (5), raccoon (1), probable opossum (1), indeterminate bird (4), large mammal (55), medium mammal (1), indeterminate mammal (13), indeterminate animal (71), indeterminate turtle (5), mussel shell (60), aquatic gastropod (3), and terrestrial gastropod (4). Hickory (*Carya* sp.) nutshell and charcoal composed the floral assemblage.

Test Unit #2 was placed along the eastern wall of the rockshelter to see if this dry portion of the site contained undisturbed deposits. The unit was excavated in six arbitrary ten cm levels which revealed four natural stratigraphic units assigned designations Zone A through Zone D. Lack of time prevented the MCNPAIP crew from excavating Unit #2 below the 60 cm level. It was, therefore, impossible to correlate the stratigraphic zones within Test Unit #2 with those in Test Unit #1.

Zone A was a recent deposit, consisting of backdirt from prior looting activity at the site. Zones B and C in Unit #2 appeared to be natural Woodland/Mississippian deposits. This interpretation was based on the compact nature of the fills and the presence of ceramics in Levels 3 and 4. The possibility exists, however, that Zone B may have been an old backdirt deposit

from past looting activities. Zone D in Unit #2 appeared to be a relatively intact Late Archaic deposit based on the presence of a Merom Cluster point in Level 6. Because Zone A was clearly the result of recent disturbance at the site, accounts of the materials from levels (1 and 2) containing portions of this zone have been omitted from the following discussion.

Level 3 crosscut two stratigraphic zones, Zones B and C, but consisted primarily of Zone B deposits. This level produced only five lithic artifacts: one chert biface, two unutilized chert flakes, and two pieces of burned sandstone. The faunal materials recovered from the level consisted of three terrestrial gastropod shells, three freshwater mussel shells, three indeterminate large mammal bones, and one mammal coprolite. The rest of the recovered artifacts consisted of two rock tempered sherds (one Plum Springs Plain; one eroded, possible Crab Orchard Fabric Impressed), and some wood charcoal.

Level 4 crosscut three stratigraphic zones, Zones B, C and D; but consisted primarily of Zone C deposits. It was more productive than the previous levels in terms of artifact numbers. Level 4 produced five unutilized chert flakes, two Baytown Plain sherds, one untyped grog tempered sherd with eroded surfaces, nine terrestrial gastropod shells, two aquatic gastropod (*Elimia* sp.) shells, one mussel shell, one box turtle bone, one deer bone, ten indeterminate large mammal bones, four indeterminate mammal bones, three indeterminate bird bones, one indeterminate turtle bone, one rabbit bone, five pieces of burned sandstone, hickory nutshell, and charcoal.

Level 5 crosscut two stratigraphic zones, Zones C and D. This level produced 13 unutilized chert flakes, two utilized chert flakes, 23 terrestrial gastropod shells, four aquatic gastropod shells, 13 aquatic gastropod (*Elimia* sp.) shells, 20 freshwater mussel shells, one skunk bone, one box turtle bone, one deer bone, 21 indeterminate large mammal bones, ten indeterminate mammal bones, four indeterminate bird bones, two indeterminate turtle bones, seven indeterminate animal bones, 12 pieces of limestone, 41 pieces of burned sandstone, hickory nutshell, and charcoal.

Level 6 was located entirely within Zone D of Unit #2 and produced two projectile point fragments, eleven unutilized chert flakes, and one piece of chert shatter/debitage. One of the projectile points was identified as a Merom Cluster point, datable to roughly 2000 B.C. to 1000 B.C. (Justice 1987:130-132); the other point was too fragmentary to assign to type. Faunal materials collected from the site included eight deer bones, 24 indeterminate large mammal bones, one raccoon bone, one box turtle bone, two indeterminate turtle bones, 12 indeterminate mammal bones, 23 indeterminate animal bones, one turkey bone, seven indeterminate bird bones, 51 freshwater mussel shell fragments, 19 aquatic gastropod (*Elimia* sp.) shells, and nine terrestrial gastropod shells. Other materials collected from the level included one piece of daub, eleven burned sandstone pieces, 14 limestone pieces, hickory nutshell, charcoal, and unidentified nut meat.

The faunal and floral data collected from Jagger Ridge Rockshelter would appear to indicate a predominantly fall use of the site. The only evidence of a possible spring-summer occupation is the bird egg shell recovered from Levels 3 and 4 in Test Unit #1; however, it is possible that the egg shell is a natural inclusion resulting from animal activity at the site. Some birds nest in rockshelters, and alternatively, the eggs could represent the meal of a raccoon or other animal that resided at the site. The question whether egg-shell, lizards, and other faunal remains at the site are the result of human activity or occur naturally at the site is symptomatic of the current inability to fully distinguish the tangible results of human from animal activity in the archaeological assemblages of rockshelters (Gifford 1982; Hoffman 1987; Hoffman and Hays 1987). Given the lack of any other evidence that would preclude all but a fall human occupation at the site, it is likely that the eggshell is not the result of human behavior.

Comparing the faunal and floral assemblages found at Jaggers Ridge Rockshelter with the results of the LP analysis (Table 22) reveals a number of correspondences as well as differences. The biggest differences are a result of the fact that the prehistoric inhabitants clearly made use of the riverine resources during their stay at MACA-65. This fact makes it necessary to examine not just the MACA-65 LP analysis results, but the results of the LP analysis of sites such as MACA-93 which contains a small portion of river and

Table 22. Comparing the MACA-65 Archaeological Data to the LP Results.

	RESOURCE AMOUNTS (*100 KG) PREDICTED BY THE VARIOUS LP MODELS					
	MACA-65 2-SEASON FALL	MACA-65 2-SEASON WINTER	MACA-93 2-SEASON FALL	MACA-93 2-SEASON WINTER IIB	MACA-93 3-SEASON FALL IB	MACA-93 3-SEASON WINTER
RESOURCES OBSERVED						
ACORNS	9.51	10.22	-----	-----	-----	-----
HICKORY	-----	-----	-----	-----	0.44	-----
DEER	-----	0.23	1.20	-----	2.55	0.74
MUSSEL	-----	-----	0.56	-----	0.62	-----
FISH	-----	-----	4.70	-----	2.27	-----
OPOSSUM	-----	-----	-----	0.01	-----	-----
NOT OBSERVED						
VIBURNUM	2.25	2.25	-----	0.59	-----	-----
SQUASH	-----	-----	-----	1.44	-----	-----
PAWPAW	4.32	-----	3.81	-----	0.34	-----
CHENOPODIUM SEEDS	-----	-----	-----	2.77	-----	3.91
BLUEBERRIES	-----	-----	-----	-----	0.17	0.24
WILD PLUM	-----	-----	-----	-----	0.18	0.19
HAWTHORN	-----	-----	-----	0.01	0.01	0.01
BERRIES	-----	-----	-----	-----	-----	0.01
BLACK CHERRY	-----	-----	-----	-----	-----	1.14
PRESENT BUT NOT PREDICTED						
WALNUT	BEAR		FOX*			
RACCOON	TURKEY		LIZARD*			
SQUIRREL	BOX TURTLE					
RABBIT	OTHER TURTLES					
WOODCHUCK*	BOBCAT*					
CRAYFISH*	SNAKE*					
AQUATIC GASTROPOD*	SKUNK*					
PORCUPINE*	FROG*					

* DENOTES A RESOURCE NOT INCLUDED IN THE LP PROGRAM MODELS.

bottomland within its catchment area and would, therefore, be expected to conform better with the archaeological record.

The two-season MACA-65 models for foraging and gardening subsistence modes in fall and winter, indicate that primary resources found at the site should consist of acorns, pawpaws, and viburnums in the fall; acorns, deer, and viburnums are to be consumed in the winter. The three-season models for MACA-65 (which excluded acorns and squash) produced infeasible solutions due to insufficient calcium. The LP results for MACA-93, the site located furthest from the river among the four-zone sites, indicates that an optimal solution for a fall occupation at MACA-65 should include dried blueberries, deer, fish, hawthorns, hickory nuts, mussels, pawpaws, wild plums, and (following its introduction) maize.

The correspondence between the archaeological record at Jaggers Ridge Rockshelter with the two-zone MACA-65 LP models is not impressive, but there is a great deal of resemblance to the MACA-93 three-season LP foraging model. There does appear to be the consumption of the LP selected resources, hickories, acorns, deer, fish, and mussels during the Archaic occupations of the site. Unfortunately, there is inadequate data to evaluate the subsequent Woodland and Mississippian occupations. The lack of pawpaws at the site suggests that the site was occupied sometime after pawpaws were no longer available, sometime after September or October.

The resources found at MACA-65 indicate that all four resource zones were utilized, at least during the Middle Archaic occupations, the period for which the subsistence evidence is most secure. This is not surprising given the results of the various LP models which indicate that exploitation of all zones provides a more economical solution compared to subsisting on upland resources alone. The presence of numerous riverine resources, in addition to the extensive accumulation of Middle Archaic deposits at the site, suggest that this site may have been occupied for longer periods compared to sites like Blue Spring Hollow Rockshelter, perhaps for several months at a time. This may indicate that the Middle Archaic occupants at Jaggers Ridge Rockshelter moved less often during their seasonal rounds, and compensated for this by utilizing resources located further away from the site. Greater site permanence may also explain the wider range of faunal species recovered at the Jaggers Ridge Rockshelter compared to Blue Springs Hollow Rockshelter.

MACA-89 Salts Cave Interior (15Ht4)

Salts Cave has been included in the present exercise, not because it represents the economic behavior of a past household, but because of the unique circumstances which have permitted the preservation of prehistoric floral remains within the cave. The prehistoric use of the cave roughly coincides with the prehistoric exploration and exploitation of Mammoth Cave (Watson 1974:95, 235-237). This period of use dates roughly from the Late

Archaic through the Early Woodland period (1500-300 B.C.). The prehistoric utilization of Salts Cave appears to have been of two forms: extraction of selenite, satinspar, mirabilite, and gypsum crust from passages deep within the cave (Munson et al. 1989; Tankersley 1989; Tankersley et al. 1985), and habitation within the Vestibule.

Known historically by at least 1809 (Watson (1974:21), and probably as early as 1802 (Watson 1969:7), Watson (1974:21) reports that Salts Cave was mined for saltpeter from 1812 to 1813. In 1875 a desiccated Indian body was discovered inside the cave by W. D. Cutliff, T. E. Lee and J. L. Lee that would later become known as Little Alice and later still as Little Al. Little Al was displayed in Proctor's Cave soon after discovery, and was later displayed at Longs Cave and later still at Mammoth Cave. [The sequence of events regarding the discovery and exhibition of Little Al are related in Meloy's (1968) book, *Mummies of Mammoth Cave*. The remains of Little Al now reside at the Museum of Anthropology, University of Kentucky.]

In 1969, Watson and a crew which included Louise M. Robbins visited the spot in Salts Cave where local tradition stated Little Al had been found. While examining the area, a soft limestone rock was found on a ledge with an inscription dated March 8, 1875 stating that this was the spot on which T.E. Lee, J.L. Lee, and W. D. Cutliff had discovered their famous "mummy", Little Al. Robbins' (1971) analysis of the young boy revealed him to be approximately nine years old. Mirabilite was found in his colon, indicating that he had

ingested the diarrhetic mineral before his death. The other contents of his colon included marshelder and chenopod seeds, grubs, and hickory nuts.

It was shortly before the discovery of Little Al, that the renowned naturalist, Frederic W. Putnam visited and recorded the following regarding Salts Cave:

> This [Salts] cave, in many respects, approaches the Mammoth Cave in the size of its avenues and chambers. Throughout one of the principal avenues, for several miles, were to be traced the ancient fire-places both for hearths and lights. . . Bundles of these fagots, tied up with twisted bark, probably the remains of ancient torches of the same character with those found in the Mammoth, Short, and Grand Avenue Caves, were also very abundant.
>
> The most important discovery in this cave, however, was made in a small chamber, about three miles from the entrance, first noticed by my guides, Messrs. Cutlip [*sic*] and Lee. On the dry soil of the floor were to be seen the imprints of the sandalled feet of the former race who had inhabited the cave, while a large number of cast off sandals were found, neatly made of finely braided and twisted leaves of rushes.
>
> A number of other articles were collected here, and were as follows: a small bunch of the inner bark of some tree, . . . several small lots of bark not quite so fine as that composing the bunch; a piece of finely woven cloth . . . a small piece of finely made fringe or tassal . . . several fragments of gourds; and two perfect flint arrowheads. Human excrements of great age . . . and . . . a few very much decayed shells of river muscles. . . It is needless to add that everything in this interesting collection which it was possible to bring away was secured [Putnam 1973:167-168].

Putnam was not the last person to come away from Salts Cave impressed with its resource potential and with some of its artifacts. Other notable collectors to later visit the cave included Bennett H. Young and Nels Nelson.

Col. Bennett H. Young visited the site in 1894 and collected a number of artifacts (Young 1897, 1910; Nelson 1917:29; Watson 1974:22). Some of these were obtained through excavations in the Vestibule of the cave. Young (1910:305) reported finding human bones mixed in with the Vestibule deposits, but they apparently disintegrated after removal from the cave (Robbins 1974:146). Young's collection of Salts Cave artifacts eventually ended up at the Heye Foundation where it was used by Orchard (1920) in his now classic monograph on aboriginal weaving methods.

Nels C. Nelson also collected artifacts from the interior of Salts Cave during his field trip to the Mammoth Cave area in 1916 for the purpose of providing specimens for the American Museum of Natural History (Nelson 1917:31). Nelson also apparently conducted some excavations at the entrance to Salts Cave, but with little success (Nelson 1916b). Still housed at the American Museum, the Salts Cave collections made by Nelson were supplemented by artifacts donated to the Museum by the Mammoth Cave Estate (Nelson 1917:30).

The year after Nelson's visit to the cave, a Mr. Lark Burnett obtained an imperfect title to Salts Cave and attempted to show it commercially (Watson 1969:9; 1974:23). The attempt to commercialize the cave was apparently short lived, as Bureau of American Ethnology archaeologist Fowke reported the entrance closed in his 1922 report on archaeological cave explorations. In that report, Fowke writes the following about Salts Cave:

> Salt Cave. -- This is 4 miles from Mammoth Cave, though belonging to the same company. The entrance is at the bottom of a conical sink hole draining about an acre. Not much water runs into the cave from this cause, as the surface slopes outward form the margin except on one side, where a ridge leads to the hills. A spring which comes out near the top of the sink falls over a ledge at the bottom into the entrance of the cave. It is said that this water soaks into the ground within a few rods ant that just beyond are large, dry rooms, well adapted for habitation, which formerly contained many evidences of aboriginal occupation. Exploration is impossible now, as the entrance was effectually closed some years ago by throwing in logs, brush, rocks, and earth, in order to protect the formations from relic hunters [Fowke 1922:115-116].

There were apparently no further serious attempts at commercializing Salts Cave following Burnett's, although the cave was shown to the public occasionally (Watson 1969:9), and continued to be visited by local cavers entering through the historic sinkhole entrance (Watson 1974:23). Salts Cave was also reportedly entered through the Chapman Entrance by members of the Blue Grass Country Club during the 1920s to obtain illegal whiskey stored in the cave (Watson 1974:23).

When Sloan and Schwartz wrote their summary on the known prehistoric sites in Mammoth Cave National Park in 1960, Salts Cave was obviously included in their list. Their discussion of the site is presented here:

> Mc 8, Salts Cave - Interior, (no interior map available for this cave, Mammoth Cave Quadrangle), located approximately 3.0 miles east-northeast of Mammoth Cave near the eastern boundary of the Park; a general site number for the Cave passages. Although not as well known as Mammoth Cave, Salts Cave seemingly has produced more artifactual material. Almost none of this material was located except in a general way, thus necessitating a general interior category. Specifically, the one artifact reported came from .5 miles inside Salts Cave; this was

> a shell-tempered sherd, found by John Nelson. N. C. Nelson found textiles (including sandals), fiber artifacts, torch material, skin, vegetable fragments (gourd, squash, sunflower head, corncob), and human feces. Mummies have supposedly been found in Salts Cave but there is no documentary proof to support such claims. Most of the above material seems to be associated with the woven sandals, although this is not definitely known. The sandal material suggests a contemporaneity with the use of the interior of Mammoth Cave - about 400 B.C. The shell-tempered sherd resembles the Neeley's Ferry Plain type (Phillips, Ford, and Griffin, 1951:105), but the handle is larger than those found in the lower Mississippi Valley. This pottery type is usually considered Middle Mississippian [Sloan and Schwartz 1960:19-20].

In 1963, the Illinois State Museum Society made funds available for limited excavation and survey within Salts Cave. The director of the project was Joseph R. Caldwell; Robert L. Hall and Patty Jo Watson were the field supervisors (Watson 1966, 1969). During the 1963 field season, two excavation units (A and B) were excavated within the upper passages of the cave (referred to as Upper Salts) and some 70 representative surface artifacts were collected from Upper, Middle, and Lower Salts passages (Watson 1969:5). These included cane torch remains, part of a wooden platter(?), mussel shells, limestone mining tools, a full grooved stone maul, sandal fragments, wood, bark, leaves, and squash and bottle gourd fragments. Forty seven fecal samples were also collected from the cave for analysis (Watson 1969:Table 1). The two test excavations produced: 3352 cane fragments, 7955 gerardia fragments, 2802 solidago fragments, 3520 woody fragments, 1465 gypsum crystals, 53 hickory nut fragments, 11 acorn fragments, 122 gerardia pod fragments, 126 root fragments, 257 bark fragments, 387 tie fragments, three

squash fragments, six gourd fragments, 16 grape tendrils, 1536 pieces of charcoal, one leaf fragment, two unidentified seeds, 24 unidentified seed pods, 106 grass/straw fragments, 20 cord fragments, nine slipper fragments, one textile fragment, four mining tools, and 38 human paleofeces samples.

Perhaps the most significant results of Watson work and that of her colleagues in Salts Cave is the information that has been gathered concerning prehistoric dietary practices and the early domestication of plants in the Green River area. Analysis (Yarnell 1969, 1974a, 1974b; Gardner 1987) of the plant remains recovered from the paleofeces taken from the cave, the intestinal contents of Little Al, and the Salts Cave Vestibule flotation samples indicates a diet high in hickory nuts and starchy seeds: sunflower (*Helianthus annuus*), marshelder (*Iva annua*), goosefoot (*Chenopodium* sp.), maygrass (*Phalaris caroliniana*), and amaranth (*Amaranthus* sp.). The wild and domesticated plant foods represented in the Salt Cavers' diets suggests use of the cave was limited primarily to the late fall through spring months (Yarnell 1969:50; Gardner 1987:364; Schoenwetter 1974). Pollen analyses of the fecal specimens obtained from the cave indicate that the period of cave use was probably highest in the spring (Schoewetter 1974:55; Watson 1974:233), which suggests that the nuts and seeds in the fecal samples represent stored foods, an hypothesis that is totally in keeping with the previous LP analysis.

Watson returned to conduct excavations in the Vestibule area of Salts Cave in 1969 and completed her work in 1971 (Watson 1974:71). Her

excavation units were designated Tests C, D, E, F, F Extension, G, H, and J. The eight units covered a total area of 29 m^2 and were located primarily near the north wall of the cave approximately 45 m from the present cave entrance. Unit D was the exception, being placed along the south wall of the cave.

Watson's Vestibule excavations revealed a stratigraphic series affected primarily by two forces: human activity in the cave and water runoff entering the cave from the sink above. The unit most affected by water runoff was Unit D, located near the southern wall of the cave. Materials recovered from Watson's excavations included 127 chert artifacts, of which 69 came from Unit D. Of these 11 were cores or core fragments, 13 were pieces of raw chert, 40 were utilized flakes, two were retouched flakes, seven were scrapers, eight were celts, 14 were projectile point or point fragments, and 32 were pieces of debitage. The identifiable projectile points included two Turkey-tail points and one Late Archaic Stemmed Cluster point (Watson 1974:Figure 12.1). Other lithic artifacts include seven ground stone celts, two whole bell-shaped pestles, two pestle fragments, six atlatl weight fragments, two tubular pipes, and four chipped limestone pieces. Worked faunal materials included six awls, four perforated teeth, one atlatl hook, one spatulate, two worked antlers, one bone bead, one needle, a polished bird bone, and ten pieces of worked shell (mostly spoons or scrapers). Other materials collected from the units included thousands of fragments of animal bones including those of deer, turkey, rabbit,

box turtle, bat, squirrel, fox, raccoon, skunk, mouse, cotton rat, rice rat, ground hog, fish, bird, dog or wolf, possible elk, and an intrusive cow.

Of particular importance in understanding the different types of prehistoric activities that occurred within Salts Cave was the recovery of nearly 2000 human bone fragments during Watson's Vestibule investigations (Robbins 1974). All of the bones were disarticulated and mixed among the rest of the site refuse; most were broken; and roughly 25 percent of the bones were burned to some degree. Many of the bones exhibited cut marks. Other forms of human bone modification were present in the form of awls fashioned from tibiae and fibulae shafts.

Robbins' (1974) analysis of the human remains collected by Watson from Salts Cave Vestibule indicated that at least 41 individuals were represented. The age and sex distribution of these individuals included three fetuses, five infants, six young children (ages six to ten years), four adolescents, six adult males, eight adult females, and nine unsexed adults.

As was pointed out earlier in the historic overview, Robbins (1974:160) offered two possible hypothesis to explain the cut marks, breakage, and burning which she found during her analysis of the human bone. Her first hypothesis was that the cut marks on the bones were the result of the defleshing of skeletons as part of the Salt Cavers' burial ritual. She suggested that after the skeletons were defleshed, the bones were broken, then carried to the cave for inhumation in the "kitchen midden" that had accumulated in

the Vestibule (Robbins 1974:160). Following burial, accidental burning of the bones occurred as a result of the building of campfires. The breakage and burning of the bones did not follow a pattern which Robbins could explain as a result of cremation practices.

Robbins' second hypothesis was that the cut, broken, and burnt human remains were the result of cannibalism. The splintering and indiscriminate scattering of human bones among the rest of the Vestibule refuse, she argues, fits the pattern one would expect from cannibalistic behavior (Robbins 1974:161).

As was mentioned earlier in the culture history summary, Watson appears to have favored the cannibalism hypothesis. She makes the following comments:

> Fragments of animal bone make up by far the largest proportion of material recovered, and indicate the hunting and eating of deer plus a series of smaller mammals. Together with the remains of game animals are many broken, splintered, and sometimes charred pieces of human bone, giving one the strong impression that the Vestibule dwellers were at least part-time cannibals [Watson 1974:83].
>
> It is difficult to avoid the conclusion that the people who were responsible were either cannibals or habitual participants in the customs of systematic torture and cruelty characteristic of many protohistoric and early historic tribes in eastern North America [Watson 1974:234].

Seeman (1986) has offered an alternative interpretation for the archaeological remains recovered in the Vestibule area of the site, one that is more in keeping with Robbins' first hypothesis involving mortuary ritual.

Seeman believes that the Salts Cave Vestibule "served as a specialized burial cave, quite possibly for reburials derived from earlier steps in a more extensive burial program" (Seeman 1986:567). As Seeman (1986:567) points out, the Salts Cave artifact assemblage seems incongruous with what one would expect from a normal habitation site. There are very few pieces of chert debris represented in Watson's Vestibule sample, and most of those recovered were obtained from Unit D which probably represents materials redeposited from the ground surface surrounding the sinkhole which forms the natural entrance to the cave. The remainder of the lithic assemblage -- the atlatl fragments, the limestone tubular pipes, celts, and pestles -- are also not inconsistent with what one might expect from a ritual mortuary site. As for explaining the co-occurrence of broken and burned human and animal bone, Seeman points out that there are other cases which can be cited in the eastern Woodlands where similar instances of mixed assemblages of animal and human bones have occurred in apparent mortuary ritual contexts (cf. Mills' [1902:472] description of the Adena Mound). It should also be noted that breaking of grave goods to "release the soul" prior to interment was a common practice in the eastern Woodlands at roughly the same point in time (Webb 1939:191-194; Walthall 1980:95) as was the mass deposition of cremated remains in caves (Webb and Wilder 1951:24-26; Walthall 1980) and the purposeful building of fires directly over fresh burials (Webb and DeJarnette 1942:303). Perhaps, in the case of Salts Cave, the long bones and skulls of the dead were purposefully broken to

release the souls that were housed within (Prentice 1986c) and the burning of the remains was due to the ritual use of fire in the mortuary process.

There is another variation on this same theme which is also a possibility. Rather than being the final repository of human skeletal remains, Salts Cave Vestibule may have been the location where bodies were buried in the flesh and were allowed to decay as the first step in a mortuary pattern which included bundling of bones for burial elsewhere (cf. Swanton 1946:721-729). After a certain amount of time had passed, the bodies would be exhumed and the bones cleaned of any remaining flesh prior to bundling. The bundled bones would then be placed in another place of burial, such as a mound, mass grave, or other cave. According to ethnohistoric accounts (Thwaites 1959; Heidenreich 1978:374), a similar mortuary process called the Feast of the Dead was practiced among the Huron at approximately ten year intervals. If a similar time interval was employed at Salts Cave, then a number of bodies would accumulate and be present in different stages of decomposition when it came time to relocate the remains. During reexcavation of the graves, older burials would be subject to breakage and loss of body parts. More recent burials would be stripped of remaining flesh using knives and other defleshing tools before being transported to the final resting place. Among the historic Huron, the removed flesh was then burned. In this scenario, the animal food remains and most of the other artifactual debris would consist of the refuse of those individuals entrusted with the task of processing the human remains at

Salts Cave. As a final result, human bones would become lost, broken, burned, and mixed with the animal remains and other artifacts found in the Vestibule.

Today the argument that mortuary processing resulted in the deposition of human remains at Salts Cave seems a much more plausible explanation than cannibalism. The use of caves for mortuary activities is well represented among the other caves in the area including Mammoth, Short, Haunted, and Bone (and possibly Longs), and there are no other sites (except perhaps the Vestibule of Mammoth Cave) where human remains appear in the same sort of contexts. It also seems much more plausible that the apparent lack of protein which precipitated the high occurrence of stored vegetal foods and the consumption of grubs, rodents, salamanders, frogs, and other small fauna found in the cave fecal specimens (Watson 1974:234) was more a result of the time of year (spring) in which the site was principally used rather than a shortage of protein in general. It has been demonstrated through the previous analyses that a shortage of protein was never a problem in the feasibility of the various LP programs. The LP programs have also shown that a diet high in stored vegetal foods would have been a very cost efficient means of obtaining the minimum dietary requirements during the spring of the year. It is not surprising, therefore, that they should represent such a high proportion of the cavers' diets. The insects, frogs, etc., which Watson cites as being evidence of a protein poor diet probably reflects the consumption of any edible item

fortuitously encountered during this lean time of the year in a site location poorly situated to exploit the resources most easily obtained in the spring.

Located 2.4 km away from the Green River, Salts Cave was categorized as a two-zone site in the LP models. As a result, the solutions to all of the MACA-89 LP models were infeasible in spring and summer. Subsistence relying solely on the spring season resources contained within the catchment zone would have carried a relatively high cost in production effort. The LP results all indicate that it would be more efficient to live closer to the river, where an adequate diet using spring resources could be obtained more efficiently. This observation would also appear to support the contention that Salts Cave Vestibule was not a typical habitation site.

Although the special purposes in which Salts Cave was used would appear to dictate the exclusion of the site as an example of typical household subsistence behavior, the persons who frequented the cave were still members of households, and still operated within an established economic system which incorporated the practical exploitation of a variety of seasonally available resources. The specialized uses of the cave would not result in the abandonment of established dietary and subsistence patterns, and it should come as no surprise that, despite the special nature of the cave, the faunal and floral assemblage basically conforms to the solutions obtained in the previous LP analysis.

The infeasible solutions obtained in the spring LP programs for MACA-89 suggest that any faunal resource that was fortuitously encountered near the cave during this time of the year should be exploited. This certainly appears to be the case with deer, turkey, rabbit, box turtle, squirrel, fox, raccoon, skunk, mouse, cotton rat, rice rat, woodchuck, fish, bird, canines, and possible elk appearing in the archaeological assemblage at Salts Cave. One could expect that when persons traveled to Salts Cave to extract minerals or ritually dispose of their relatives they carried with them some food from their main habitation. In the spring of the year, it is expected that most habitation sites would be located near the river where riverine and floodplain resources would have been more easily exploited. It is probably unreasonable, therefore, to model the subsistence practices exhibited at Salts Cave in terms of a two-zone site catchment given the special nature of the site. A pattern closer to those exhibited by the four-zone MACA-93 spring and winter LP models or the two-season MACA-000 spring and winter models (Table 23) would appear to be a more realistic expectation of the types of decision-making that would have resulted in the subsistence behavior exhibited at the cave. Again, this appears to be the case with fish, freshwater mussels, and numerous floodplain plant species present among the recovered plant and animal remains.

The patterns exhibited in the Salts Cave assemblage conform relatively well with the two-season MACA-000 spring season model which identifies deer, turkey, bear, chenopodium greens, poke greens, and tubers as the optimal

Table 23. Comparing the MACA-89 Archaeological Data to the LP Results.

	RESOURCE AMOUNTS (*100 KG) PREDICTED BY THE VARIOUS LP MODELS					
	MACA-89 2-SEASON WINTER	MACA-93 2-SEASON SPRING IIC	MACA-93 3-SEASON SPRING IIA	MACA-93 2-SEASON WINTER	MACA-000 2-SEASON SPRING	MACA-000 2-SEASON WINTER II
RESOURCES OBSERVED						
ACORNS	10.80	-----	-----	-----	-----	-----
CHENOPODIUM SEEDS	-----	-----	2.79	2.77	-----	3.94
SQUASH	-----	-----	-----	1.44	-----	0.75
DEER	0.28	0.83	-----	-----	2.70	-----
FISH	-----	2.28	2.27	-----	-----	-----
TURKEY	-----	1.26	-----	-----	0.80	-----
BEAR	-----	-----	-----	-----	0.67	-----
TUBER	-----	-----	-----	-----	5.81	-----
RABBIT	-----	-----	-----	-----	-----	0.03
NOT OBSERVED						
AMARANTH GREENS	-----	0.69	-----	-----	-----	-----
CHENOPODIUM GREENS	-----	0.14	0.03	-----	0.56	-----
POKE GREENS	-----	0.77	0.72	-----	1.45	-----
VIBURNUM	1.38	-----	-----	0.59	-----	0.77
HAWTHORN	-----	-----	-----	0.01	-----	0.08
OPOSSUM	-----	-----	-----	0.01	-----	-----
PRESENT BUT NOT PREDICTED						
HICKORY	MUSSELS					
WALNUTS	BOX TURTLE					
SUNFLOWER SEED	SQUIRREL					
MAYGRASS SEED*	RACCOON					
MARSHELDER SEED*	WOODCHUCK*					
AMARANTH SEED*	FOX*					
DOG*	SKUNK*					
FROG*	GRUBS*					

* DENOTES A RESOURCE NOT INCLUDED IN THE LP PROGRAM MODELS.

solution to a three-zone catchment area. Inclusion of the MACA-000 two-season winter LP results would add chenopodium seeds, squash, rabbit, viburnum and hawthorn to the dietary mix. Similarly, the two-season spring (version IIC) solutions for MACA-93 identify deer, fish, turkey, amaranth greens, poke greens, and chenopodium greens as optimal resources while the three-season spring solutions for MACA-93 incorporate fresh and dried fish, chenopodium seeds, and fresh greens (amaranth, chenopodium, and poke) in the optimal spring diet.

Despite the limitations and the over simplifications present in the LP models, the similarities exhibited between the LP analyses and the uniquely preserved floral and faunal assemblages found at Salts Cave are nonetheless indicative of the general soundness of the basic LP assumptions. There are obvious omissions in the plant and animal species included in the LP models, over simplifications in the daily consumptive constraints, preferences in taste, and food taboos, lack of firm control over the effects of off-site food production and site formational processes, and there are certainly questions regarding the reliability of the cost factors attributed to each of the foods included in the models. Despite these inadequacies and uncontrolled factors, the range of sites included in the various LP models have produced results that to a certain degree reflect the patterns exhibited at Salts Cave and other sites included in the current sample. The basic correspondence can be attributed to the basic soundness of the variables and assumptions included in the LP models, and

where they do not correspond, it is believed that it is primarily due to the inadequate control of the factors just mentioned. In the case of Salts Cave, the linear programming results add additional evidence to the proposition that Salts Cave was utilized primarily in the spring for specialized purposes: mineral extraction and mortuary ritual. It also stands in contradiction to the proposition that the upper Green River drainage was an area in which the local inhabitants found themselves lacking adequate protein and that this was a reason for resorting to cannibalism.

MACA-93 Owl Cave (15Ed43)

Owl Cave is a limestone cave located just below the bluff rim in the northwest corner of Cedar Sink. The existence of Owl Cave was probably known to Nels Nelson who reported that he visited an archaeological site at Cedar Sink in 1916 (Nelson 1917). Watson and Carstens (1975) were the first archaeologists to refer specifically to the Owl Cave site:

> GRS-19 Owl Cave. Owl Cave is located on the south side of Green River in the north-northwest corner of Cedar Sink. The cave is approximately 80 meters long, 25 meters wide, and has a maximum ceiling height of about 34 meters. Two Early Woodland-like points were found near the opening of the cave and were probably washed into the cave. Several chert blades and core fragments and fragments of deer and turkey bones were scattered in front of the cave; no prehistoric ceramic material were located on the surface of this site [Watson and Carstens 1975: Appendix A, Part 2, Page 3].

Carstens also conducted test excavations within the vestibule of Owl Cave and concluded that Owl Cave was occupied sporadically during the

Middle Archaic, Late Archaic, and Early Woodland periods (Carstens 1980:80-81). The test units located within the vestibule consisted of four one meter square units excavated in arbitrary ten cm levels. Based on the stratigraphic and artifactual evidence exhibited in the four units, Carstens assigned horizon designations (I, II, and III) to three major periods of occupation. These were dated by Carstens on the basis of projectile point forms recovered within the units. Horizon III contained a MacCorkle point (Plate 1i), an apparent Terminal Archaic Barbed Cluster point (Plate 1j), and a "Lamoka-like" point (Plate 1k). Horizon II contained an Adena point (Plate 1a), two Buck Creek points (Plate 1e and f), and a MacCorkle (Plate 1g). Horizon III contained a Turkey-tail point (Plate 1h).

Based on the projectile point typology of the day, Carstens attributed the age of Horizon I to the Early to Middle Archaic period, Horizon II to the Middle to Late Archaic period, and Horizon III to the Late Archaic to Early Woodland period. Today, with the benefit of more radiocarbon dates in association with these projectile point types, it now appears that the dates of occupation are more likely Early to Late Archaic for Owl Cave Horizon I and Early Woodland for Horizons II and III.

Other artifacts recovered in the Owl Cave assemblages included a wide range of chert tools and debitage including bifaces, unifaces, and flakes. Bone tools were also present in the form of antler tine flakers, a hide scraper, bone awls, and an abrader (Carstens 1980:88-89).

The faunal assemblage associated with Owl Cave Horizon I consisted of 44 deer elements, four turkey, one box turtle, one raccoon, one squirrel, one woodchuck, two woodrat, one mouse, and one rabbit. Horizon II contained 88 deer elements, nine turkey, three raccoon, two squirrel, one beaver, one woodchuck, one freshwater mussel, and two mouse. Horizon III contained 34 deer, two raccoon, one squirrel, one woodchuck, one woodrat, and two mouse elements. If Horizon II and Horizon III units are combined into one Early Woodland assemblage, and woodrat and mouse elements are ignored as natural inclusions, then the following species are represented in terms of element frequencies: deer (85%), turkey (6%), raccoon (3%), squirrel (2%), beaver (1%), woodchuck (2%), and mussel (1%). The frequencies for Horizon I are nearly identical: deer (83%), turkey (8%), box turtle (2%), raccoon (2%), squirrel (2%), woodchuck (2%), and rabbit (2%) with only slight changes in the minor species present.

Carstens' analysis of the deer remains indicated that the entire carcass was not transported to the site, and that the general lack of distal elements suggested that only the portions of the deer with the greatest amounts of meat (e.g., hind quarters) were being regularly transported back to the site for consumption. Carstens was also able to identify the period of the year when the deer were killed on the basis of tooth eruption patterns. Those data indicate October to January was the period of mortality.

The floral assemblage at the site consisted primarily of charred hickory nut fragments and carbonized wood with the exception of one small walnut fragment from Horizon II and a cucurbit seed-hull from Horizon III (Carstens 1980:91). Hickory nuts appear to have been exploited to a greater degree in the later two horizons than in Horizon I. Wagner (1978:60) concluded that the pound and boil method was probably the method used to extract the meat and oil from the hickory nuts at Owl Cave.

The high percentage of hickory nut fragments, in addition to the faunal data, led Carstens to conclude that the occupations at Owl Cave represented fall occupations with an emphasis on exploiting upland resources, primarily deer and hickory nuts. Carstens (1980:90) also noted the low frequency with which riverine-related vertebrates were represented in the faunal assemblage.

Owl Cave thus appears to generally adhere to the patterns predicted in the LP analyses (Table 24). Located nearly two kilometers from the river, the site apparently represents several October-January occupations with a consistent emphasis on utilizing upland resources. The faunal and floral assemblage generally conforms to fall/winter patterns identified for both the two-season and three-season LP models, perhaps conforming best to the three-season models. As discussed in the section entitled "Summarizing the Two-season LP Results'" deer can be expected to constitute a major resource in both fall and winter at sites located away from the river. If riverine resources are available, fish and mussels should also be exploited in the fall. In the winter,

Table 24. Comparing the MACA-93 Archaeological Data to the LP Results.

	RESOURCE AMOUNTS (*100 KG) PREDICTED BY THE VARIOUS LP MODELS			
	MACA-93 2-SEASON FALL	MACA-93 2-SEASON WINTER IIB	MACA-93 3-SEASON FALL IB	MACA-93 3-SEASON WINTER
RESOURCES OBSERVED				
HICKORY	-----	-----	0.44	-----
DEER	1.20	-----	2.55	0.74
MUSSEL	0.56	-----	0.62	-----
SQUASH	-----	1.44	-----	-----
NOT OBSERVED				
VIBURNUM	-----	0.59	-----	-----
PAWPAW	3.81	-----	0.34	-----
CHENOPODIUM SEEDS	-----	2.77	-----	3.91
BLUEBERRIES	-----	-----	0.17	0.24
WILD PLUM	-----	-----	0.18	0.19
HAWTHORN	-----	0.01	0.01	0.01
BERRIES	-----	-----	-----	0.01
BLACK CHERRY	-----	-----	-----	1.14
FISH	4.70	-----	2.27	-----
OPOSSUM	-----	0.01	-----	-----
PRESENT BUT NOT PREDICTED				
WALNUT	SQUIRREL			
RACCOON	RABBIT			
BOX TURTLE	TURKEY			
DOG*	BEAVER			
WOODCHUCK*				

* DENOTES A RESOURCE NOT INCLUDED IN THE LP PROGRAM MODELS.

rabbit and squash should be added to the diet if they are available for exploitation.

When comparing the faunal and floral data with more specific aspects of the LP models (Table 24), it is worth noting that according to the MACA-93 three-season fall (variation IB) model, deer should make up the greatest portion (38.6%) of the diet by weight. The remaining portion of the diet should consist of 34.6% fish, 9.4% mussel, 6.6% hickory nuts, 5.1% pawpaw, 2.8% wild plum, 2.6% stored blueberries, and 0.2% hawthorns. Carstens excavations appear to indicate that deer did constitute a significant portion of the faunal resources exploited at the site and that mussels and hickory nuts were also eaten, as the model predicted. The absence of fish among the faunal remains may reflect the time of year in which the site was occupied, sample size, the distance of the site from the river, or a combination of all three factors. The lack of pawpaws at the site would suggest that the site occupations occurred sometime after September/October. If this is the case, it may be that fish were being excluded from the diet, in part, because of the obstacles of fishing in cold weather.

MACA-137 Dry Creek (15Ed131)

The Dry Creek site was mentioned earlier as being an early Mississippian site that was thought to be roughly contemporary with Blue Spring Hollow Rockshelter on the basis of similarities in their ceramic

assemblages. The Dry Creek site is located on a small levee on the Green River floodplain approximately 600 m west of the Nolin River. The site was discovered in the fall of 1987 by the MCNPAIP crew while conducting shovel tests in Shovel Test Block 6B (Prentice 1988).

The Dry Creek site is a particularly exciting find in that it contains a midden buried 20 cm or more below the present land surface that has not been disturbed by plowing. The site covers an area of approximately 0.7 hectares, and, based on the ceramics and other materials from the site, Dry Creek appears to be an early Mississippian farmstead or hamlet. Materials collected from the site during shovel testing included: three shell-tempered sherds and one sand-tempered sherd with eroded exteriors, four Baytown Plain sherds, 11 Mississippi Plain sherds, two shell-and-grog-tempered Mississippi Plain *var. Dry Creek* sherds, one McKee Island Cord Marked sherd, two Kennett Plain sherds, 21 chert flakes, and four pieces of chert debitage.

MCNPAIP crew members returned to the site during the third field season in order to conduct test excavations (Prentice 1990a). Seven excavation units of various sizes were excavated at different locations within the site. These were assigned unit numbers in the order in which they were excavated. Text Units #2 and #3 failed to produce any artifacts or subsurface features. Artifacts, a midden deposit, and two subsurface features were encountered in the other five test units.

Unit #1 was a one-by-one meter unit that was placed at the same location where Shovel Test 6B-4-8 had been excavated during the 1987 field season. Because shovel test 6B-4-8 had already indicated that a midden deposit was present below a mostly sterile plowzone in this portion of the site, Unit #1 was excavated in natural levels. Level 1 consisted of plowzone. It was removed with shovels without screening the soil. All of the midden material below the plowzone was excavated as Level 2. Materials collected in Level 2 included 53 unutilized chert flakes, five pieces of chert debitage, three chert cores, one chert uniface, one piece of clay daub, one deer bone, three indeterminate large mammal bones, 28 shell-tempered Mississippi Plain sherds, one shell-tempered McKee Island Cord Marked sherd, two shell-and-grog-tempered Mississippi Plain *var. Dry Creek* sherds, 19 shell-tempered sherds with eroded surfaces, two shell-and-grog-tempered sherds with eroded surfaces, one rock-tempered sherd with eroded surfaces, eight unutilized quartz/quartzite flakes, some hickory nut fragments, charcoal, 750 pieces of sandstone rough rock, and 61 pieces of limestone rough rock.

Two pieces of wood charcoal collected from Level 2 were submitted for radiocarbon assay to Beta Analytic. Both samples (Beta-31112 and Beta-31113) were chemically pretreated by Beta Analytic, then sent to the Eidgenossische Technische Hochschule (ETH) in Zurich for radiocarbon dating using the Accelerator Mass Spectrometry (AMS) technique. The resulting

uncorrected dates were 1035 +/- 65 B.P. (A.D. 915 +/- 65) and 940 +/- 75 B.P. (A.D. 1010 +/- 75).

The midden zone within Unit 1 was found to be roughly 20 cm thick at the northern end of the unit, and was shallower or less thick toward the south. The midden consisted of very dark brown to very dark grayish brown loam with numerous flecks of charcoal and burned clay. Beneath the midden was a dark brown loam subsoil.

Although it was not apparent while excavating Level 2, a prehistoric pit feature of nearly identical very dark grayish brown loam cut through the midden and extended into the underlying subsoil. The pit feature was first recognized at the base of Level 2 in the western half of the excavation unit when the subsoil below the midden was exposed throughout the rest of the unit. Examination of the west profile wall, then revealed the stratigraphic relationship between the pit feature and the midden layer. The remaining portion of the pit feature was given the designation Feature 1 and was excavated separately as a natural unit.

Materials recovered from Feature 1 included six unutilized chert flakes, one piece of chert debitage, one indeterminate large mammal bone, two indeterminate mammal bones, one indeterminate small mammal bone, 19 pieces of indeterminate animal bone, one indeterminate fish bone, six pieces of limestone rough rock, and four shell-tempered Mississippi Plain sherds.

Floral materials included black walnut, maize (*Zea mays*), hickory, and wood charcoal.

One piece of wood charcoal collected from Feature 1 was submitted for radiocarbon assay to Beta Analytic. The sample (Beta-31116) was sent to ETH for radiocarbon dating using the AMS technique. The resulting uncorrected date was 1035 +/- 80 B.P. (A.D. 915 +/- 80).

Test Units #4 and #5 were excavated in close proximity to Test Unit #1 in the hopes of learning more about the nature of the midden and encountering other subsurface features. Test Unit #4 was a one-by-two m unit located four m to the east of Unit #1. The unit was excavated to a depth of roughly 35 cm below the ground surface without encountering a midden deposit. The excavated soils were relatively barren of artifacts, but four artifacts were collected without screening the excavated soil. These included one shell-tempered Mississippi Plain sherd, one shell-tempered sherd with eroded surfaces, and two unutilized chert flakes.

Test Unit #5 was a two-by-half meter trench extending eastward from the northeast corner of Test Unit #1. It was excavated in two levels. Level 1 consisted of plowzone and underlying sterile subsoil, Zone A. Level 1 was not screened for artifactual materials, and no artifacts were observed during excavation. Level 2 consisted of midden soil and was assigned the designation Zone B. Level 2 was excavated to sterile subsoil which appeared at a depth of

roughly 50 cm at the western end of the unit and 65 cm at the eastern end of the unit. The soil from Level 2 was screened using 1/4 inch mesh.

Unit #5 Level 2 produced two projectile points, 132 non-utilized chert flakes, eight pieces of chert debitage, three utilized chert flakes, two chert bifaces, one projectile point preform, one denticulate, three chert cores, one piece of burned clay, two shell-tempered Mississippi Plain sherds, eight shell-tempered sherds with eroded surfaces, one shell-tempered Bell Plain sherd, charcoal, eleven pieces of limestone rough rock, and 129 pieces of sandstone rough rock.

Excavation of Unit #5 revealed that the midden deposit in this portion of the site dips toward the east where it is buried at a greater depth below the present ground surface. Excavation of the unit also revealed a possible pit feature beneath the midden zone. The possible pit feature was only partly exposed along the northern margin of Unit #5 and was given the designation of Feature 2. Feature 2 consisted of dark brown loam containing a few flecks of charcoal. Lack of time did not permit further investigation of Feature 2.

Test Unit #6 was located four m east and 25 m north of Test Unit #2. Unit #6 was a one-by-two meter unit excavated in two levels. Level 1 consisted of plowzone and was terminated at roughly 33 cm below the ground surface when subsoil was encountered. The plowzone was not screened for artifactual materials and none were observed during excavation.

Level 2 consisted of a brown silt loam subsoil and was excavated to a depth of ten cm below the plowzone at which point it was terminated due to lack of time. All soil from the level was screened through 1/4 inch mesh.

Unit #6 Level 2 produced one projectile point, 14 unutilized chert flakes, ten pieces of sandstone rough rock, one Bell Plain sherd, six Mississippi Plain sherds, seven shell-tempered sherds with eroded surfaces, six shell-and-grog-tempered Mississippi Plain *var. Dry Creek* sherds, five shell-and-grog-tempered sherds with eroded surfaces, and one untempered untyped sherd.

The artifactual content of the soil excavated as Level 2 in Unit #6 would appear to indicate that it is possibly cultural in origin (i.e., midden), but the lack of charcoal and other dark organic materials would suggest that these materials were displaced into the "sterile" subsoil due to bioturbation. Without further excavation, the true nature of the subsoil in Unit #6 remains in question.

Test Unit #7 was excavated after a 30 cm square column flotation sample was taken from the northwestern corner of Unit #1 along the western profile wall. While removing the column sample, an apparent edge to the Zone B midden in Unit #1 was uncovered. Test Unit #7 was excavated to see if this apparent edge of the Zone B fill might be the edge of a Mississippian pit house and that the midden might be house basin fill. Excavation of the two meter long and 30 cm wide Unit #7 revealed that the apparent edge was nothing more that a plow scar beneath the main plowzone. Excavation of the unit was

terminated at the base of the plow zone. One chert biface was recovered at the base of the unit.

To summarize, the excavations at MACA-137 have revealed an early Mississippian farmstead or hamlet located on the floodplain of the Green River. A buried midden is present as are subsurface pits (Features 1 and 2). The artifactual analysis has revealed a ceramic assemblage consisting primarily of shell (Mississippi Plain) and shell-and-grog (Mississippi Plain *var. Dry Creek*) ceramics with one McKee Island Cord Marked sherd also present.

Unfortunately the faunal remains were fragmentary and in poor condition as a result of the generally acidic nature of the local soils. What was recovered does indicate the exploitation of deer and fish as well as small and medium sized mammals. The use of crushed shell as a tempering agent in the Mississippian pottery may also be used to infer the consumption of freshwater mussels. In addition, the occupants of the site ate maize, but also exploited the available wild flora, specifically black walnut and hickory.

The presence of fish, maize, walnut, and hickory would appear to indicate a summer to fall occupation of the site. Not enough data is available to evaluate the possibility that the site was occupied during other seasons of the year. Given the location of the site on the floodplain, however, it is unlikely that it would have been occupied during the early spring when annual flooding would have made such an occupation subject to inundation. The

presence of a midden at the site, suggests on the other hand, a fairly long and stable occupation may have occurred at this site.

The Dry Creek site is presumably the remains of an early Mississippian farmstead, and as such probably represents what is essentially the warm weather phase of a Mississippian household's normal seasonal activities in the upper Green River drainage. As is typically the case among Mississippian households, maize was raised as a food source and presumably contributed a significant portion of the diet. The presence of maize in the floral assemblage at Dry Creek, conforms to the post-maize subsistence model generated by the three-season MACA-137 LP programs. Although maize is not identified as a food source to be consumed in the summer or fall in the MACA-137 LP models, it is targeted as contributing the largest portion of the optimal spring diet. Viewed from the perspective that maize may have served its most important economic and nutritive roles as a stored resource to be consumed in late winter or early spring, it is perhaps easier to understand why hickory nuts and other naturally available floral resources continued to be targeted as important fall resources in the Mississippian subsistence system.

The location of the Dry Creek site on the Green River floodplain conforms with the current expectations that most Mississippian households would locate their homes near their agricultural fields, which all evidence suggests were normally created by clearing sections of the forest in major floodplain areas to take advantage of the rich, easily tilled soils. With the

adoption of maize gardening, protecting the fields from animal pests would have been a natural concern that would have prompted location of the household residence close to the fields.

Simultaneously, settlement along the river would have facilitated the exploitation of those zones which are most productive in the late spring and summer of the year: the river and floodplain. In the Mammoth Cave area, the narrow floodplains would have also have meant that any site situated in the bottomlands would have also provided immediate access to the surrounding bluffline and upland areas. This would have allowed easy access to all four resource zones, and conforms to the basic expectations formulated in the LP models.

The LP programs that were generated based on the MACA-137 two-season scenarios (Table 25) indicated that the optimum fall resource mix should consist of deer (upland resource), pawpaws (bluffline), and fish and mussels (riverine resources). The winter diet should consist of chenopodium seeds (bottomland), hawthorns (bottomland), rabbits (all zones), squash (bottomland), and viburnums (bluffline). The spring solution advocates the consumption of fish (river) and amaranth greens (bottomland), while the summer diet should consist of amaranth greens, fish, and mussels.

In comparison, the three-season models for MACA-137, which excluded squash from the list of available resources, concluded that deer, fish, mussels, pawpaws, and wild plums (bottomland) should form the fall diet. The winter

Table 25. Comparing the MACA-137 Archaeological Data to the LP Results.

	RESOURCE AMOUNTS (*100 KG) PREDICTED BY THE VARIOUS LP MODELS				
	MACA-137 2-SEASON SUMMER II	MACA-137 3-SEASON SUMMER IA	MACA-137 2-SEASON FALL	MACA-137 3-SEASON FALL IC	MACA-137 3-SEASON SPRING IIIA
RESOURCES OBSERVED					
DEER	-----	-----	1.20	1.77	-----
FISH	-----	8.52	4.70	5.40	-----
MUSSEL	-----	0.40	0.56	0.57	-----
MAIZE	-----	-----	-----	-----	3.69
NOT OBSERVED					
SQUASH	15.60	-----	-----	-----	-----
AMARANTH GREENS	-----	0.33	-----	-----	2.30
TUBER	-----	0.52	-----	-----	-----
PAWPAW	-----	-----	3.81	0.38	-----
WILD PLUM	-----	-----	-----	0.57	-----
PRESENT BUT NOT PREDICTED					
HICKORY					
WALNUT					

solution calls for a diet heavily reliant on stored foods: dried berries (upland or bottomland), dried black cherries (bottomland), chenopodium seeds (bottomland), deer (upland), dried hawthorns (bottomland), and dried wild plums (bottomlands). According to the LP spring solution, once again, should consist of amaranth greens and maize, while amaranth greens, mussels, tubers, and fish should constitute the summer diet.

The available evidence from MACA-137 shows that while the site's inhabitants did make use of resources found in all of the surrounding resource zones and incorporated resources selected in the LP models, these did not include a number of the optimal resources which one would expect to find at the site were it inhabited for most of the year, particularly autumn. The absence of plant remains other than maize, hickory, and walnut, suggest that sample size may be the best explanation for this apparent lack of correspondence between the models and the archaeological record. The poor preservation of faunal remains at the site obviates the need to explain the possible reasons why mussel shells do not occur in the faunal assemblage in the numbers one would expect.

MACA-171 Kingbird Rockshelter (15Ed162)

Kingbird Rockshelter is located at the base of the bluff near the head of Blowing Spring Branch Hollow. This large rockshelter site was discovered by the MCNPAIP crew in the spring of 1988 while conducting bluffline survey in

Bluffline Survey Area 73. Surface collected diagnostics included projectile points that were assignable to the following types: one Little Bear Creek (Late Archaic to Early Woodland, 1500-500 B.C.), one Copena Triangular (Middle Woodland, A.D. 150-500), two Copena Cluster (Middle Woodland, A.D. 150-500), one Lowe Flared Base (Middle Woodland, A.D. 200-600), one Lowe Cluster (Middle to Late Woodland, A.D. 100-800), one Hamilton Incurvate (A.D. 500-1000), and two Madison points (Late Woodland to Mississippian, A.D. 800-1400).

The 46 surface collected sherds included twenty Rough River Cordmarked, four Mulberry Creek Plain, two Mulberry Creek Plain *var. Kingbird*, four Rough River Simple Stamped, one untempered untyped sherd with smoothed surfaces, three limestone-tempered sherds with eroded exteriors, one Baytown Plain, one Blue Lake Cordmarked, three Mississippi Plain, one Mississippi Plain *var. Rough River*, three Mississippi Plain *var. Dry Creek*, one McKee Island Cord Marked, one Wolf Creek Check Stamped, and one shell-tempered sherd with eroded exterior. The shell-tempered Mississippi Plain, McKee Island Cord Marked and Wolf Creek Check Stamped ceramics can be assigned to the Mississippian period, and the Rough River Simple Stamped can be assigned to the Middle Woodland period, while the temporal assignment of the other ceramics is less sure, either Early, Middle, or Late Woodland.

The MCNPAIP crew returned to conduct test excavations at Kingbird Rockshelter on November 11, 1988 (Prentice 1990a). Three one-by-one test units were excavated at the site. Two of the units were placed inside the shelter, while one was placed outside the dripline. All three units were excavated in ten cm levels, and all excavated soils were screened through 1/4 inch mesh.

Test Unit #1 was located near the backwall of the rockshelter and was excavated in arbitrary ten cm levels. Two soil zones were encountered within the unit. The top zone, Zone A, was highly disturbed, apparently as a result of bioturbation and looting activity. Below Zone A there appeared to be an intact depositional unit, assigned the designation, Zone B. Zone B was very dry and powdery to the touch, and was capable of preserving uncarbonized floral remains. Limestone bedrock was encountered below Zone B at a depth of 34 cm.

Materials recovered from Unit 1 Zone B included the following chert materials: one projectile point, one biface, one uniface, 157 unutilized flakes, 13 utilized flakes, nine pieces of shatter/debitage, and two pieces of chert rough rock. The projectile point fragment could not be assigned to type. Faunal materials from the level included 14 deer bones (one butchered), two squirrel bones, one duck bone, 96 indeterminate large mammal bones, 20 indeterminate mammal bones, four indeterminate medium mammal bones, five indeterminate bird bones, 21 indeterminate animal bones, one box turtle element, 23

indeterminate turtle bones, and 22 freshwater mussel shell fragments. Ceramic materials from the level consisted of one rock-tempered Plum Springs Smoothed Over Cordmarked sherd, two Mulberry Creek Plain sherds, three limestone-tempered sherds with eroded surfaces, one rock-tempered Plum Springs Cordmarked *var. Plum Springs* sherd, and one rock-tempered sherd with eroded surfaces. Floral materials collected from the level included hickory nutshell, black walnut nutshell, unidentified nutshell, and charcoal. Other materials included six pieces of burned clay, seven pieces of daub, 32 pieces of sandstone (three burned), two unutilized limestone flakes, and one piece of limestone rough rock.

The artifacts recovered from Zone B indicate that this depositional unit dates to the Woodland period, probably the Early to Middle Woodland. This temporal placement is based on the recovery of the Mulberry Creek Plain, Plum Springs Plain, and Plum Springs Smoothed Over Cordmarked ceramics. The faunal and floral materials reveal a wide range of habitat exploitation. The hickory and black walnut remains indicates a probable fall/winter occupation of the site.

Test Unit #2 was excavated in the talus slope outside the dripline of the rockshelter. The excavations within Unit #2 revealed an upper zone (Zone A) of black loam approximately 30 cm in depth overlying a very dark grayish brown loam (Zone B). The excavations were terminated when a stone cyst burial was encountered in the unit. Bioturbation and mixing of deposits was

evident throughout both zones, making any interpretation of the cultural associations of recovered artifacts questionable at best. Species of animals represented in the deposits included deer, turtle, bird, mussels, gar (*Lepisosteus* sp.), raccoon, and squirrel. Floral materials included hickory, black walnut, unidentified bark, and unidentified nutshell.

During the excavation of Unit #2, a flexed human burial was encountered at a depth of roughly 75 cm below the ground surface. The individual had apparently been buried in a pit placed on his or her right side in a fetal position and had been covered with large slabs of sandstone before being interred. No evidence of the pit was visible in the profiles of the unit.

When the burial was first encountered, bone fragments were found scattered throughout the unit. The disarticulated remains were removed in the hope that the unit could be excavated further without disturbing an intact burial, but excavations ceased when it was realized that a primary burial was present within the unit.

The burial appeared to be that of a robust female, although it is possible that the individual was a gracile male. The posterior end of the zygomatic process extended as a slight crest past the external auditory meatus, suggesting that the individual was a male. The mastoid process, however, was somewhat gracile suggestive of a female. The age of the individual was estimated to be between 18 and 25 years. No artifacts were in direct association with the burial although a Lowe Flared Base point was recovered

in close proximity to the burial. The bioturbation evidenced by disarticulated bones and the lack of any pit feature definition in the unit make any direct association between the Lowe Flared Base point with the burial tenuous at best, but a Woodland burial appears to be likely given the manner in which the person was buried (i.e., flexed and covered with stone slabs).

Test Unit #3 was excavated within the rockshelter in an attempt to find deeper deposits than those encountered in Test Unit #1. Excavations in Unit #3 revealed an upper zone (Zone A) of very dark brown silty loam midden overlaying a yellowish brown clay sterile subsoil. Within Unit #3, at least one pit feature (Feature 1), and possibly a second (Feature 2) containing Zone A type soils had been excavated into the underlaying subsoil. The boundaries of these two features were clearly delimited in plan view at the base of level 4 (40 cm BS) of the unit. A large portion of Feature 1 fell within the limits of Unit #3, so it was possible to discern the form and nature of the deposits within this pit feature. Only a small portion of Feature 2 occurred within the north east corner of the test unit, so the exact nature of this apparent pit feature remains unknown.

Feature 1 was circular to oval in plan view with a diameter of 1.0 or more meters. The pit had insloping to vertical walls and a flat floor. The floor of the pit was encountered at 67 cm below the present ground surface. In the southern portion of the feature, the lower portions of pit fill contained a high

concentration of charcoal which was sampled separately for flotation (FS# 1110) and later assigned a separate zone designation (Zone 2).

Levels 1 through 3 fell within the upper Zone A midden in Test Unit 1. Collectively they contained the following chert items: two projectile point fragments, one uniface, two blades, one denticulate, one Late Archaic drill, four bifaces, two cores, one knife, 18 utilized flakes, 214 unutilized flakes, and 11 pieces of shatter/debitage. The remainder of the lithic materials consisted of four unutilized limestone flakes and nine pieces of sandstone (one burned). The pottery assemblage was composed of nine Rough River Cordmarked, two Blue Lake Cordmarked, and two Rough River Cordmarked *var. Blowing Spring* sherds. Floral materials consisted of black walnut nutshell, hickory nutshell, and charcoal. The faunal material consisted of the following number of elements: deer (17), rabbit (1), raccoon (1), opossum (2), bear (1), box turtle (5), indeterminate turtle (55), indeterminate bird (16), frog (2), catfish (2), pit viper (Crotalinae) (1), large mammal (157), medium mammal (1), indeterminate mammal (28), indeterminate animal (36), *Pleurobema* sp. mussel (1), three ridge (*Amblema plicata*) mussel (1), pocketbook mussel (*Lampsilis ovata*) (2), indeterminate mussel (27), *Lithasia* sp./*Anculosa* sp. (1), and terrestrial gastropod (3).

Level 4 consisted of Zone A midden lying just above the sterile subsoil, and as such is probably roughly contemporary with Feature 1. It produced the following chert items: three projectile point fragments, three bifaces, one

utilized flake, 97 unutilized flakes, and five pieces of shatter/debitage. One of the projectile points was assigned to the Lowe Flared Base Cluster; the remaining point fragments could not be assigned to type. The faunal materials from the level included the following number of elements: deer (10), bear (1), raccoon (1), box turtle (3), large mammal (1), small mammal (2), indeterminate mammal (9), bird (3), turtle (15), indeterminate animal (14), freshwater mussel (9), and terrestrial gastropod (1). The remaining collected materials included one Rough River Cordmarked sherd, one limestone-tempered sherd with eroded surfaces, 14 pieces of sandstone, and burned clay.

Feature 1 produced the following chert artifacts: one biface, one denticulate, 14 utilized flakes, 123 unutilized flakes, 11 pieces shatter/debitage, and one piece of rough rock. Ceramics materials consisted of two Mulberry Creek Plain and two Rough River Cordmarked sherds. Faunal materials included deer (13), beaver (1), box turtle (1), turtle (16), fox (1), large mammal (91), medium mammal (2), bird (7), indeterminate mammal (22), indeterminate animal (31), aquatic gastropod (3), terrestrial gastropod (4), and freshwater mussel (8). Floral materials collected included hickory nutshell, unidentified nutshell, and wood charcoal.

Two pieces of wood charcoal collected from Feature 1 were submitted for radiocarbon assay to Beta Analytic. The samples (Beta-31114, Beta-31115) were dated using the AMS technique. Resulting uncorrected dates were 2585 +/- 65 B.P. (635 B.C. +/- 65) and 2385 +/- 70 B.P. (435 B.C. +/- 70).

In summary, investigations at the Kingbird Rockshelter have demonstrated the repeated occupation of this site for several thousand years. Diagnostic artifacts from the Late Archaic through Mississippian periods have been recovered from the site. The repeated occupation of the rockshelter is probably a reflection of its size; it is by far the largest overhang in Blowing Spring Branch Hollow.

Excavations in Test Unit #2 have revealed that burials are present at the site. This is apparently the first reported placement of a burial outside the dripline of a rockshelter in the Mammoth Cave area. The placement may reflect the shallow soil deposits overlying bedrock along the backwall of the shelter where rockshelter burials often occur.

Excavations in Test Unit #3 revealed the presence of pit features within the rockshelter. These pit features were probably used as food storage units; there was no evidence (e.g., burned clay, fire cracked rock) that would suggest that their function involved cooking. The presence of storage pits would appear to indicate relatively extended occupations of the site, probably on a seasonal basis in the fall, during which time foods were stored in pits like Feature 1 prior to processing for consumption.

Feature 1 was radiocarbon dated to sometime around 600-400 B.C. and contained both Mulberry Creek Plain and Rough River Cordmarked ceramics. These limestone-tempered ceramics are typically associated with the Middle Woodland period in the Green River area. The 600-400 B.C. date would

appear to indicate that these ceramic types occur early in the Middle Woodland period and may also be considered late Early Woodland, as Schock and Dowell (1981) have indicated. Floral materials from Feature 1 consisted entirely of nutshell (hickory) and wood charcoal. No known plant domesticates were recovered. The faunal materials recovered from the feature reflect a wide range of habitat exploitation. Beaver and freshwater mollusks were resources available only in the Green River. Nutshell resources would be most easily acquired in the adjacent upland forests. The deer, fox, birds (most of which are probably turkey), and turtles could be acquired from a number of habitats. The presence of nut resources at the site would appear to indicate a fall occupation of the site during the time Feature 1 was used and backfilled.

Although, diagnostic artifacts recovered from the Kingbird Rockshelter indicate that the site was visited at various times during the Late Archaic through Mississippian periods, the principal occupations appear to have occurred during the early Middle Woodland period. The available evidence for the Woodland deposits encountered at MACA-171 indicates the use of the site primarily, if not exclusively, in autumn, probably by a single, perhaps extended, family.

The autumn two-season and three-season foraging models developed for MACA-171 (Table 26) both identified a combination of deer, fish, mussel, and pawpaws as the optimal solution to the problem. The same combination was obtained in the two-season post-maize LP solution. The post-maize three-

Table 26. Comparing the MACA-171 Archaeological Data to the LP Results.

	RESOURCE AMOUNTS (*100 KG) PREDICTED BY THE VARIOUS LP MODELS				
	MACA-171 2-SEASON FALL	MACA-171 2-SEASON WINTER I	MACA-171 3-SEASON FALL IA	MACA-171 3-SEASON WINTER	MACA-93 3-SEASON FALL IB
RESOURCES OBSERVED					
HICKORY	-----	-----	-----	-----	0.44
DEER	1.55	0.57	2.72	0.68	2.55
MUSSEL	0.56	-----	0.59	-----	0.62
FISH	4.99	-----	4.17	-----	2.27
NOT OBSERVED					
PAWPAW	2.25	-----	0.22	-----	0.33
SQUASH	-----	-----	-----	-----	-----
VIBURNUM	-----	1.17	-----	-----	-----
BLUEBERRIES	-----	-----	-----	0.16	0.17
WILD PLUM	-----	-----	-----	0.35	0.18
HAWTHORN	-----	0.03	-----	0.25	0.01
BERRIES	-----	-----	-----	0.03	-----
BLACK CHERRY	-----	-----	-----	1.20	-----
CHENOPODIUM SEEDS	-----	3.89	-----	3.89	-----

PRESENT BUT NOT PREDICTED	
WALNUT	OPOSSUM
BEAR	BEAVER
TURKEY	RACCOON
BOX TURTLE	DUCK
OTHER TURTLES	SQUIRREL
FOX*	AQUATIC GASTROPOD*
FROG*	SNAKE*

* DENOTES A RESOURCE NOT INCLUDED IN THE LP PROGRAM MODELS.

season model recommended the use of deer, fish, maize, mussel, pawpaw, and wild plum, but this solution is not applicable to the datable Kingbird deposits since the Middle Woodland occupation at the site, which has been radiocarbon dated to roughly 600-400 B.C., probably predates the introduction of maize into the region (Chapman and Shea 1981; Ford 1985; Smith 1986:50-51).

Also pertinent in the present discussion is the relatively good correspondence between the archaeological assemblage at King Bird Rockshelter with the three-season fall (variation IB) LP results obtained for Owl Cave (MACA-93), another four-zone rockshelter site located away from the river and containing a smaller portion of river area within its catchment. The reduced availability of fish in the MACA-93 model has resulted in the addition of hickory nuts to the optimal LP solution for the fall diet. This solution recommends that 89% of the diet by weight consist of hickory nuts, deer, mussels, and fish, the remaining portion of the diet to consist of pawpaws, blueberries, wild plum, and hawthorn. The correspondence between this LP solution and the assemblage recovered at Kingbird Rockshelter seems relatively good.

As one can see from the previous lists of plant and animal species recovered from Kingbird Rockshelter, all of the recommended foods in the foraging models except pawpaws were among the plant and animal remains encountered at the site. The absence of pawpaws may be a reflection of the

period in which the site was occupied (i.e., after September/October) or it may be due to preservation factors and/or sample size.

The Kingbird Rockshelter site, located roughly 1.5 km away from the river, fits the general pattern established for the preceding rockshelter sites. Autumn occupations are indicated in all cases, and the most commonly utilized resources are hickory nuts, deer, mussels, turkey, and miscellaneous small mammals. The basic proposition, that sites located away from the river should primarily be fall/winter sites is thus reconfirmed in the case of the Kingbird Rockshelter site. In this case, Kingbird Rockshelter appears to represent a late fall encampment by an incipient Middle Woodland household.

SUMMARY AND CONCLUSIONS

The LP results just presented, while certainly imperfect, allow one method of evaluating the various hypotheses that have been put forth in the preceding chapters and explaining why they appear to be valid. They help explain why during 3000+ years of prehistory, beginning in the Late Archaic period and continuing until the Mississippian period, there is no significant change in the settlement patterns exhibited in the Mammoth Cave area in particular, and the upper Green River drainage in general. Once gardening as a means of food production had become established by the Late Archaic period, the seasonal round of site occupation and resource exploitation would remain essentially the same for the remainder of known Native American prehistory in the Green River valley.

The major economic factors affecting site selection remained relatively unchanged even as the number of domesticated plants continued to increase with time because the primary value of these domesticated resources was probably in the ability to store them for consumption in winter and early spring. Nuts, deer, fish, mussels, turkey, and other naturally available foods continued to be economically important because they could often be procured

and stored with less effort than their domesticated counterparts and because they adequately fulfilled the dietary needs of the people who consumed them.

A pattern of wild and domesticated resource utilization was established by the Late Archaic which resulted in an emphasis on riverine and bottomland resources in late spring to early fall and upland resources in late fall to early spring. This, in turn, resulted in a residence pattern that continued relatively unchanged over 3000 years and produced an archaeological record typified today by late spring-early fall floodplain sites such as Carlston Annis and Dry Creek and late fall-early spring sites such as Blue Spring Hollow Rockshelter.

The reasons for this basically stable residence pattern have primarily to do with the availability of subsistence resources. During the spring and summer months, the most productive areas in the Green River valley are the river itself and the floodplain which it crosses. Fish, mussels, various greens, tubers, berries, and other foods were available at a time when the adjacent upland areas had much less to offer in comparison. People located their residences near the river where they could take advantage of the distribution of these natural resources.

With the adoption of gardening as a food production method, the availability of floodplain soils became an even greater factor in the selection of site location. In the vicinity of Mammoth Cave National Park, the narrow floodplains would have not been very conducive to supporting many households practicing this mode of subsistence. Sixty kilometers down stream, in the Big

Bend area where the floodplain reaches a breadth of over a mile, a much greater number of potential garden spots would have allowed a much larger residential population. Extensive and repeated occupations in the Big Bend area in the form of numerous Late Archaic, Woodland, and Mississippian shell mound and midden sites exemplify this choice in settlement location.

As the emphasis on raising domesticated plants increased, presumably reaching its greatest emphasis in the Mississippian period, the broad floodplains such as those found in the Big Bend area would have been a preferred locality in which to clear fields and build homes. It comes as no surprise, therefore, that it is in this area of the Green River that the nearest Mississippian mound center is found.

While lacking in the terms of riverine bottomlands, the Mammoth Cave area certainly possessed extensive upland resources, which would have been at their most productive in the late fall and winter. Rockshelters and caves rimmed the edges of the uplands and afforded natural shelter to those who chose to exploit the available nuts, deer, turkey, and other plants and animals. At this time of the year, the narrow floodplain and shallow waters of the Green River afforded easier access to the river's supply of fish and mussels and reduced the amount of distance one had to travel to exploit the various resource zones. To take best advantage of the situation, upland sites in the Mammoth Cave area were most often located on the broad upland ridges

immediately adjacent to the floodplain or in the bottoms immediately adjacent to a major hollow so that access to the upland resources would be easier.

This combination of factors resulted in the settlement patterns exhibited in Mammoth Cave National Park today, and helps explain other aspects of Mammoth Cave area archaeology as well. It resolves, for instance, the previously unanswered question as to why domesticated plants so well represented in Salts and Mammoth Cave are so rarely encountered in the rockshelter sites surrounding them (Gremillion 1990). It is because these sites continued to be used by the Native Americans as relatively short term seasonal occupations for the primary purpose of exploiting the late fall and winter resources of the uplands, most importantly nuts and deer.

It also explains why, as was noted previously, pottery is generally found in such low numbers at the rockshelter and upland sites found within the Park. Residence at such sites probably seldom lasted more than a month at a time, making transportation of more than a few pots to these sites burdensome and cumbersome. Production of pottery at the site, probably would have been minimal since ethnographic evidence indicates that making pottery during the cold and/or wet weather months would have been hampered by poor drying conditions (Shepard 1971). What pottery was available, would certainly have been transported away from the site if it wasn't broken during use. The result, relatively few examples of pottery are found at the rockshelter and upland sites in the Mammoth Cave area.

Having explained from an economic perspective why the settlement patterning did not change significantly over this 3000+ year period of time, and confirming that the Mammoth Cave National Park sites represent primarily the autumn portion of the yearly season round, one is still left to puzzle over a number of points at which the LP models fail to adequately predict the floral and faunal assemblages exhibited at the sites included in the analytical sample. In those cases where the LP models omit certain species of animals such as raccoon, squirrel, rabbit, turkey, box turtle, and other small game (but these species are found in relative abundance at sites such as Blue Spring Hollow, Jaggers Ridge, and Kingbird Rockshelters) the reasons for the discrepancies are rather obvious. The models identify the optimal resources which should be exploited solely on the basis of least cost and nutritional benefit. They do not compensate for hunting methods which include the indiscriminate trapping of all small animals that enter a snare or deadfall or the opportunistic taking of an animal while pursuing another. They also do not compensate for the assigment of hunting tasks according to age and/or physical ability, such as the collecting of box turtles by children. There are also other reasons for hunting other than to obtain meat. Animals are sources of hides for clothing, bones and teeth for tools, feathers for fletching arrows and decoration, etc. Further, with more extended occupations of such sites, the use of more costly, less optimal resources results when the more economical resources are used up.

The LP models also fail to more accurately reflect reality by not providing a means of compensating for relations of production, the ways in which the members of a household assign and perform various productive tasks. In those cases where the LP programs identified combinations of plant resources as the main or sole elements in the optimal solution during a particular season, resources which ethnographic data indicates were largely produced by the females in the households of eastern North America, one can hardly expect that the males in the households would have stopped their proscribed tasks of hunting for animal resources. The males would have continued to hunt, not only because it was among their usual tasks, but probably also to add variety to the diet. On the other hand, one might expect that it would be at those times of the year (i.e., spring) when the household could subsist most efficiently on stored foods provided primarily by the women, that males would spend greater time in non-subsistence-oriented tasks such as cave exploration and warfare (cf. Webb 1939:168).

It should also be pointed out that in those cases where the LP models identify chenopodium seeds as a significant optimal resource, other similar seed producing plants such as amaranth, marshelder, maygrass, and perhaps sunflowers, would probably have been considered equivalents in terms of storability, nutritive content, and cost of production. Given the possible dire consequences of relying too heavily on a single plant crop, it should not be surprising that the women who raised these domesticates pursued the

cultivation of a number of species in order to reduce overall risk of crop failure. This is another aspect where the current LP programs lack adequate control over a specific decision-making factor, the attempt to reduce risk through greater product diversity.

The discrepancies exhibited between the current LP models and the use of several plant resources suggest that other factors have not been controlled for as well. The two-season LP models recommend the consumption of bitter acorns in greater quantities than is found in the archaeological record. This is possibly the result of two factors: (1) an over-estimation of the true production cost of hickory nuts using the pound and boil method or an under estimation of the true production costs associated with bitter acorn meal production, and (2) a preference for hickory nuts over acorns due to their extractable oils and/or lack of bitter taste. Anyone who has eaten hickory nuts can appreciate the fine flavor and the quality of this floral resource. Bitter acorns, on the other hand, require an extensive leaching process to provide an edible meal. Given the choice between these two similar resources, the apparent preference for hickory nuts is not surprising.

The lack of any evidence for pawpaws or wild plums at any of the fall sites is perhaps harder to explain than the low occurrence of acorns. In each of the cases where pawpaws and wild plums are identified as optimal resources that are to be consumed in large quantities, evidence for the use of the fruit is absent. This apparent inconsistency has previously been explained by

assuming that: (1) site occupations postdated the period in which the fruits would have ripened, (2) it is a reflection of sample size, or (3) it is due to the fortunes of preservation. Another explanation, in the case of pawpaws, may be that the value of pawpaws is overemphasized in the two-season models due to their over-simplified assumptions. The three-season fall LP models select pawpaws as part of the optimal mix at a rate of roughly one tenth the proportion called for in the two-season fall LP models. This, in addition to the other factors just cited, may best explain the absence of pawpaw seeds in the sites examined here.

Although a combination of all of the above explanations may be the true reason why pawpaw seeds were not encountered at any of the studied sites, it is quite possible that the absence of wild plums may, like acorns, be due to the bitter taste of the fruit. Reidhead (1981:178) includes in his discussion of wild plums the observation that Native American groups generally found the fruit to be too bitter to eat when the fruit first ripened (August), and that they would sometimes bury the wild plums or wait till the first frost to pick them so that they would be more palatable. It is likely, therefore, that while wild plums were used at least occasionally as a food source in the region (they were recovered at Carlston Annis), they were probably not a preferred food because of their bitter taste. This, probably more than any other factor, best explains the absence of evidence of wild plum use at the autumnal rockshelter sites.

Clearly, however, preservation has been a factor in determining which plant resources are represented in the assemblages at the sites included in this study and other similar sites. This is what makes sites such as Salts Cave and Mammoth Cave so invaluable in the attempt to understand past diets and modes of subsistence. Still, the Salts Cave record probably represents by and large only the spring portion of the year, and may have varied somewhat from normal household consumption due to the special nature of this site. Plants that were eaten in quantity in the spring and at other times of the year, such as greens, tubers, and berries are seldom encountered in the archaeological record due to the structural makeup of the food source and the preparation methods involved. Were it not for the durability of nutshells and the apparently common practice of roasting the nuts in the shell in order to help preserve them by killing the seed germ and any insects within (Keller 1987:181), the evidence for the consumption of hickory, acorn, and other nuts may have been even more meager than it already is.

LP analysis is one means of assessing the accuracy of the plant record encountered at archaeological sites such as those found at Mammoth Cave National Park. The differential preservation of different floral and faunal species often precludes the direct assessment of the possible contribution of different plant and animal species in the diet. It is a difficult process to take the counts and weights of bones, shells, and seeds found at a site and to conclude that any one species contributed a specific percentage of the diet

(Grayson 1979; Wing and Brown 1979). With LP analysis (and perhaps better control over the factors which affect the outcome of the optimal solution) an independent and alternative means of evaluating the results of archaeological dietary studies is possible.

As a last note, the present study is compared to Reidhead's (1981) earlier study of the Leonard Haag site. In that study, Reidhead used LP analysis to evaluate the effect which the adoption of maize production had on Fort Ancient peoples who lived at that southeastern Indiana site and compared their subsistence patterns to those of the preceding Late Woodland occupants who presumably had not adopted maize, or at least had not done so to any significant degree.

Reidhead (1981:113) concluded that prior to the full-scale adoption of maize gardening, the primary mode of Late Woodland production was still centered on hunting and gathering, a pattern that was predicted by the LP models. That conclusion is not so clearly supported when it is pointed out that squash and "weed seeds" were important products in the optimal solutions and found among the Haag site's Late Woodland assemblage. It seems more likely that the Late Woodland peoples at Haag relied heavily on domesticated "weeds" as a food source, just as the Woodland peoples of the upper Green River valley also apparently relied significantly upon them. Although chenopodium seeds have been treated in the current suite of LP models as natural resources, in reality, they probably were propagated in substantial

numbers in garden plots along with other seed-bearing annuals from the Late Archaic period on.

With the adoption of maize horticulture, Reidhead's optimal solution called for a reduction in the use of deer as a source of calories, since maize could provide them at a much lower cost. The archaeological record did not conform to this pattern with deer continuing to be a primary food source, and Reidhead offered several explanations why. The most important of these was the value of deer as a source of hides and the preference for deer meat over other potential protein sources, particularly fish. In all other respects, the resources used by both Late Woodland and Fort Ancient peoples at Haag were essentially the same with hickory nuts, acorns, pawpaws, and weed seeds among the most important floral resources and turkey, raccoon, opossum, squirrel, turtle, and beaver among the most commonly used faunal resources.

Reidhead concluded, based on the archaeological data and its correspondence with the LP analysis which he performed, that labor minimization was an important aspect of subsistence decisions in both Late Woodland and Fort Ancient times, but it was clearly not the only factor. Reidhead found for example, that fish resources were not utilized to full effect, and hazelnuts and walnuts were used in numbers greater than their labor costs should have allowed. Presumably, these deviations from the model reflect taste preferences over other cultural factors. As Reidhead (1981:110-111) notes, "It is likely that decisions comparable to those observed at Haag

will typify the behavior of people whose environments, technology, and population constraints offer sufficient diversity of choice to allow the satisfaction of consumption preferences while simultaneously assuring dietary security." It appears that the same can be said regarding hickory nut over acorn use in the Green River valley.

Although there are problems with the LP analyses which have been presented in the current examples, there are also obvious benefits to the pursuit of such analyses. They force one to evaluate the complex interactions of humans with their natural environment in ways that would not normally be considered in less formal methods. To be treated adequately, they require the examination of each archaeological site as part of a larger settlement and economic system. Therefore, unless the full range of site types is included in the modeling of the subsistence system, the results will be incomplete and misleading. Another advantage is that they attempt to model the past in terms of individual decision-making and individual behavior.

Lest one conclude otherwise, I state emphatically that LP models which focus on the satisfaction of nutritional constraints alone can never hope to offer complete models of past decision-making involving food or any other form of production. Other goals: political, social, and religious, are weighed in the decision-making process. Perhaps, then, the greatest potential utility of these and future LP models will be in their use as a basis to see where behavior deviates from the theoretical optimum, to identify those instances where

political, social, or religious concerns have directed past decision-making processes regarding subsistence, specialization, exchange, and so forth. Thus, while problems remain to be ironed out, this method of analysis is worth additional pursuit in future archaeological studies of subsistence and economy.

REFERENCES CITED

Ambrose, Stanley H.,
1987 Chemical and Isotropic Techniques of Diet Reconstruction in Eastern North America. In *Emergent Horticultural Economies of the Eastern Woodlands*, edited by William F. Keegan, pp. 87-107. Occasional Paper No. 7. Center for Archaeological Investigations, Southern Illinois University, Carbondale.

Arnold, Dean E.
1975 Ceramic Ecology of the Ayacucho Basin, Peru: Implications for Prehistory. *Current Anthropology* 16:183-194.

Arzigian, Constance
1987 The Emergence of Horticultural Economies in Southwestern Wisconsin. In *Emergent Horticultural Economies of the Eastern Woodlands*, edited by William F. Keegan, pp. 217-241. Occasional Paper No. 7. Center for Archaeological Investigations, Southern Illinois University, Carbondale.

Asch, David L., and Nancy E. Asch
1985 Prehistoric Plant Cultivation in West-Central Illinois. In *Prehistoric Food Production in North America*, edited by Richard I. Ford, pp. 149-204. University of Michigan Museum of Anthropology, Anthropological Papers No. 75.

Baber, Willie L.
1987 Conceptual Issues in the New Economic Anthropology: Moving Beyond the Polemic of Neo-classical and Marxist Economic Theory. In *Beyond the New Economic Anthropology*, edited by John Clammer, pp. 45-77. Macmillan Press, London.

Barlett, Peggy F.
1980 Introduction: Development Issues and Economic Anthropology. In *Agricultural Decision Making: Anthropological Contributions to Rural Development*, edited by Peggy F. Barlett, pp. 1-15. Academic Press, New York.

Barlett, Peggy F. (editor)
1980 *Agricultural Decision Making: Anthropological Contributions to Rural Development*. Academic Press, New York.

Barlett, Peggy F.
1989 Introduction: Dimensions and Dilemmas of Householding. In *The Household Economy: Reconsidering the Domestic Mode of Production*, edited by Richard R. Wilk, pp. 3-10, Westview Press, Boulder.

Bartram, William
1980 *Travels Through North and South Carolina, Georgia, East and West Florida*. University Press of Virginia, Charlottesville. (Reprint of 1792 edition.)

Beard, Benjamin H.
1981 The Sunflower Crop. *Scientific American* 244(5):150-161.

Beditz, Lindsay C.
1979 *Archeological Reconnaissance and Testing of Alternative JCCCC Sites in Mammoth Cave National Park.* Manuscript on file. Southeast Archeological Center, Tallahassee.

1981 *Mammoth Cave National Park, Kentucky: Bluffline Survey of the Childress Farm/Great Onyx Job Corps Civilian Conservation Center Property*. Manuscript on file. Southeast Archeological Center, Tallahassee.

Bender, Margaret M., David A. Baerris, and Raymond L. Steventon
1981 Further Light on Carbon Isotopes and Hopewell Agriculture. *American Antiquity* 46:346-353.

Benington, Frederick, Carl Melton, and Patty Jo Watson
1962 Carbon Dating Prehistoric Soot from Salts Cave, Kentucky. *American Antiquity* 28:238-241.

Bennett, John W.
1969 *Northern Plainsmen: Adaptive Strategy and Agrarian Life*. Aldine, Chicago.

1976 *The Ecological Transition: Cultural Anthropology and Human Adaptation*. Pergamon Press, New York.

Bennett, John W., and Don Kanel
1983 Agricultural Economics and Economic Anthropology: Confrontation and Accomodation. In *Economic Anthropology: Topics and Theories*, edited by Sutti Ortiz, pp. 201-247. University Press of America, Lanham, Maryland.

Bettinger, Robert L.
1980 Explanatory/Predictive Models of Hunter-Gatherer Adaptation. In *Advances in Archaeological Method and Theory*, vol. 3, edited by Michael B. Schiffer, pp. 189-255. Academic Press, New York.

1987 Archaeological Approaches to Hunter-Gatherers. *Annual Review of Anthropology* 16:121-142.

Binford, Lewis R.
1977 *For Theory Building in Archaeology*. Academic Press, New York.

Bloch, Maurice (editor)
1975 *Marxist Analyses and Social Anthropology*. Malaby Press, London.

Boserup, Ester
1965 *The Conditions of Agricultural Growth: The Economics of Agrarian Change Under Population Pressure*. Aldine, Chicago.

Boyett, Patricia S.
1973 Analysis of Skeletal Material from Mammoth Cave. Manuscript on file. Southeast Archeological Center, Tallahassee.

Braun, David P.
1977 Middle Woodland--(Early) Late Woodland Social Change in the Prehistoric Central Midwestern U.S. Ph.D. dissertation, Department of Anthropology, University of Michigan, Ann Arbor.

Braun, David P., and Stephen Plog
1982 Evolution of "Tribal" Social Networks: Theory and Prehistoric North American Evidence. *American Antiquity* 47:504-525.

Brose, David S.
1970 *The Summer Island Site: A Study of Prehistoric Cultural Ecology and Social Organization in the Northern Lake Michigan Area*. Studies in Anthropology No. 1, Case Western Reserve University, Cleveland.

Brose, David S., and N'omi Greber (editors)
1979 *Hopewell Archaeology: The Chillicothe Conference*. The Kent State University Press, Kent, Ohio.

Brown, James A.
1971 The Dimensions of Status in Burials at Spiro. In *Approaches to the Social Dimensions of Mortuary Practices*, James A. Brown, editor, pp. 92-112. Memoirs of the Society for American Archaeology No. 25.

Brumfiel, Elizabeth M., and Timothy K. Earle
1987 Specialization, Exchange, and Complex Societies: An Introduction. In *Specialization, Exchange, and Complex Societies*, edited by Elizabeth M. Brumfiel and Timothy K. Earl, pp. 1-9. Cambridge University Press, Cambridge.

Brumfiel, Elizabeth M., and Timothy K. Earle (editors)
1987 *Specialization, Exchange, and Complex Societies*. Cambridge University Press, Cambridge.

Bryne, Stephen C., and James E. Card
1990 *The Archeological Testing of the Heritage Trail Loop, Old Guides Cemetery Fence, and Longs Cave Entrance, Mammoth Cave National Park, Kentucky*. Southeast Archeological Center, Tallahassee.

Buikstra, Jane E.
1977 Biocultural Dimensions of Archeological Study: A Regional Perspective. In *Biocultual Adaptation in Prehistoric America*, edited by Robert L. Blakely, pp 85-100. Southern Anthropological Society Proceedings, No. 11. University of Georgia Press, Athens.

Buikstra, Jane E., Jill Bullington, Douglas K. Charles, Della C. Cook, Susan R. Frankenberg, Lyle W. Konigsberg, Joseph B. Lambert, and Liang Xue
1987 Diet, Demography, and the Development of Horticulture. In *Emergent Horticultural Economies of the Eastern Woodlands*, edited by William F. Keegan, pp. 67-85. Occasional Paper No. 7. Center for Archaeological Investigations, Southern Illinois University, Carbondale.

Burling, Robbins
1962 Maximization Theories and the Study of Economic Anthropology. *American Anthropologist* 64:802-821.

Bushnell, David I., Jr.
1914 Archaeological Investigations in Ste. Genevieve County, Missouri. *Proceedings of the United States National Museum* 46:641-668.

Butler, Brian M., and Richard W. Jefferies
1986 Crab Orchard and Early Woodland Cultures in the Middle South. In *Early Woodland Archeology*, edited by Kenneth B. Farnsworth and Thomas E. Emerson, pp. 523-534. Kampsville Seminars in Archeology, Vol. 2, Center for American Archeology Press, Kampsville, Illinois.

Butzer, Karl W.
1982 *Archaeology as Human Ecology: Method and Theory for a Contextual Approach*. Cambridge University Press, Cambridge.

Caldwell, Joseph R.
1958 *Trend and Tradition in the Prehistory of the Eastern United States*. Memoir 88. American Anthropological Association.

Cancian, Frank
1968 Maximization as Norm, Strategy, and Theory: A Comment on Programmatic Statements in Economic Anthropology. *American Anthropologist* 68:465-470.

Carey, Henry A.
1942 *Report to the Superintendent of Mammoth Cave National Park of The John M. Nelson Collection*. Manuscript on file, Southeast Archeological Center, Tallahassee.

Carneiro, Robert L.
1967 On the Relationship Between Size of Population and Complexity in Social Organization. *Southwestern Journal of Anthropology* 23:234-243.

1970 A Theory of the Origin of the State. *Science* 169:733-738.

Carr, Christopher
1984 The Nature of Organization of Intrasite Archaeological Records and Spatial Analytic Approaches to Their Investigation. In *Advances in Archaeological Method and Theory*, vol. 7, edited by Michael B. Schiffer, pp. 103-222. Academic Press, Orlando.

Carstens, Kenneth C.

1974 *Archeological Surface Reconnaissance of Mammoth Cave National Park*. Master's Thesis, Department of Anthropology, Washington University, St. Louis.

1978 *Mammoth Cave National Park: Archeological Survey of Proposed Water Lines and Sewers*. Manuscript on file. Southeast Archeological Center, Tallahassee.

1980 *Archeological Investigations in the Central Kentucky Karst*. Ph.D. Dissertation, Department of Anthropology, Washington University, St. Louis.

Carstens, Kenneth C., and Kandis K. Jenings

1977 Three Springs Pumphouse: An Assessment of Damage. Manuscript on file, Mammoth Cave National Park, Kentucky.

Casselberry, S. E.

1974 Further Refinement of Formulae for Determining Population from Floor Area. *World Archaeology* 6(1):117-122.

Chang, K. C.

1975 Ancient Trade as Economics or as Ecology. In *Ancient Civilization and Trade*, edited by Jeremy A. Sabloff and C. C. Lamberg-Karlovsky, pp. 211-224. University of New Mexico Press, Albuquerque.

Chapman, Jefferson

1973 *The Ice House Bottom Site 40Mr23*. Report of Investigations, No. 13. Department of Anthropology, University of Tennessee, Knoxville.

Chapman, Jefferson, and Bennie C. Keel

1979 Candy Creek-Connestee Components in Eastern Tennessee and Western North Carolina and their Relationship with Adena-Hopewell. In *Hopewell Archaeology, The Chillicothe Conference*, edited by David S. Brose and N'omi Greber, pp. 157-161. Kent State University Press, Kent.

Chapman, Jefferson, and Andrea B. Shea

1981 The Archaeobotanical Record: Early Archaic Period to Contact in the Lower Little Tennessee River Valley. *Tennessee Anthropologist* 6:61-84.

Chayanov, A. V.
1966 *The Theory of Peasant Economy*. Richard D. Irwin, Homewood, Illinois.

Cheal, David
1989 Strategies of Resource Management in Household Economies: Moral Economy or Political Economy? In *The Household Economy: Reconsidering the Domestic Mode of Production*, edited by Richard R. Wilk, pp. 11-22. Westview Press, Boulder.

Chisholm, Michael
1968 *Rural Settlement and Land Use: An Essay in Location*. Aldine, Chicago.

Christaller, W.
1966 *Central Places in Southern Germany*. Prentice-Hall, Englewood Cliffs. (Translated from the 1933 original *Die Zentralen Orte in Suddeutschland* by C. W. Baskin)

Clammer, John (editor)
1987 *Beyond the New Economic Anthropology*. Macmillan Press, London.

Clarke, David L. (editor)
1977 *Spatial Archaeology*. Academic Press, New York.

Clay, Rudolf Berle
1963 *Ceramic Complexes of the Tennessee-Cumberland Region in Western Kentucky*. M.A. thesis, Department of Anthropology, University of Kentucky, Lexington.

1979 A Mississippian Ceramic Sequence for Western Kentucky. *Tennessee Anthropologist* 4:111-128.

1980 The Culture Historical Placement of Fayette Thick Ceramics in Central Kentucky. *Tennessee Anthropologist* 5:166-178.

1984 Morris Plain: And Other West Kentucky Ceramic Smoking Guns. *Tennessee Anthropologist* 9:104-113.

Cleland, Charles E.
1976 The Focal-Diffuse Model: An Evolutionary Perspective on the Prehistoric Cultural Adaptations of the Eastern United States. *Midcontinental Journal of Archaeology* 1:59-76.

Cohen, Mark N.
1977 *The Food Crisis in Prehistory: Overpopulation and the Origins of Agriculture*. Yale University Press, New Haven.

1987 The Significance of Long-Term Changes in Human Diet and Food Economy. In *Food and Evolution: Toward a Theory of Human Food Habits*, edited by Marvin Harris and Eric B. Ross, pp. 261-283. Temple University Press, Philadelphia.

Collins, Lewis
1848 *Historical Sketches of Kentucky: Embracing its History, Antiquities, and Natural Curiosities, Geographical, Statistical, and Geological Descriptions; with Anecdotes of Pioneer Live, and More Than One Hundred Biographical Sketches of Distinguished Pioneers, Soldiers, Statesmen, Jurists, Lawyers, Divines, Etc.* Lewis Collins, J. A. and U. P. James, Cincinnati.

1874 *History of Kentucky*. Second edition. Lewis Collins, Covington, Kentucky.

Comer, Douglas C.
1976a Archeological Survey of the Four Alternative Relocation Areas for the Job Corps Center at Mammoth Cave National Park. Manuscript on file. Southeast Archeological Center, Tallahassee.

1976b Archeological Survey of the Second Nolin Reservoir Site: A Fifth Alternative Relocation Area for the Jobs Corps Center at Mammoth Cave National Park. Manuscript on file. Southeast Archeological Center, Tallahassee.

Conkey, Margaret W., and Janet Spector
1984 Archaeology and the Study of Gender. In *Advances in Archaeological Method and Theory*, edited by Michael B. Schiffer, pp. 1-38. Academic Press, Orlando.

Cook, Scott
1973 Production, Ecology, and Economic Anthropology: Notes Toward an Integrated Frame of Reference. *Social Science Information* 12(1):25-52.

Cooper, Robert G.
1978 Dynamic Tension: Symbiosis and Contradiction in Hmong Social Relations. In *The New Economic Anthropology*, edited by John Clammer, pp. 138-175. St Martin's Press, New York.

Cowan, C. Wesley
1985 Understanding the Evolution of Plant Husbandry in Eastern North America: Lessons from Botany, Ethnography and Archaeology. In *Prehistoric Food Production in North America*, edited by Richard I. Ford, pp. 205-243. University of Michigan Museum of Anthropology, Anthropological Papers No. 75.

Crawford, Gary W.
1982 Late Archaic Plant Remains from West-Central Kentucky: A Summary. *Midcontinental Journal of Archaeology* 7:205-224.

Crites, Gary D.
1991 Investigations Into Early Plant Domesticates and Food Production in Middle Tennessee: A Status Report. *Tennessee Anthropologist* 16:69-87.

Crothers, George M.
1981 Archeological Investigations in Sand Cave, Kentucky. *Eight International Congress of Speleology, Proceedings* 1:374-376.

1983 Archaeological Investigations in Sand Cave, Kentucky. *National Speleological Society Bulletin* 45:19-33.

Crumley, Carole L.
1979 Three Locational Models: An Epistemological Assessment for Anthropology and Archaeology. In *Advances in Archaeological Method and Theory*, Vol. 2, edited by Michael B. Schiffer, pp. 141-173. Academic Press, New York.

Crumley, Carole L., and William H. Marquardt
1987 *Regional Dynamics: Burgundian Landscapes in Historical Perspective*. Academic Press, San Diego.

Dalton, George
1967 Primitive Money. In *Tribal and Peasant Economies*, edited by George Dalton, pp. 254-281. University of Texas Press, Austin.

1969 Theoretical Issues in Economic Anthropology. *Current Anthropology* 10:63-102.

1975 Karl Polanyi's Analysis of Long-Distance Trade and His Wider Paradigm. In *Ancient Civilization and Trade*, edited by Jeremy A. Sabloff and C. C. Lamberg-Karlovsky, pp. 63-132. University of New Mexico Press, Albuquerque.

Deetz, James J.
1965 *The Dynamics of Stylistic Change in Arikara Ceramics.* Series in Anthropology, No. 4, University of Illinois, Urbana.

DeGarmo, Glen D.
1977 Identification of Prehistoric Intrasettlement Exchange. In *Exchange Systems in Prehistory*, edited by Timothy K. Earle and Jonathon E. Ericson, pp. 153-170. Academic Press, New York.

Delcourt, Paul A., and Hazel R. Delcourt
1981 Vegetation Maps for Eastern North America: 40,000 Yr. B.P. to the Present. In *Geobotany II*, edited by Robert C. Romans, pp. 123-166. Plenum Press, New York.

DiBlasi, Philip J.
1987a *Archaeological Monitoring of the Water Pipeline at the Floyd Collins Complex.* Manuscript on file, Southeast Archeological Center, Tallahassee.

1987b Drawings Found in Salts Cave. *CRF Newsletter* 15, No. 4:1-2.

1989 Prehistoric Graffiti and Self Expression: Examples from the Central Kentucky Karst. Paper presented at the Southeast Archaeological Conference, Tampa.

Duffield, Lathel F.
1974 Nonhuman Vertebrate Remains from Salts Cave Vestibule. In *Archeology of the Mammoth Cave Area*, edited by Patty Jo Watson, pp. 123-134. Academic Press, New York.

Earle, Timothy K., and Andrew L. Christenson (editors)
1980 *Modeling Change in Prehistoric Subsistence Economies.* Academic Press, Orlando.

Earle, Timothy K., and Jonathon E. Ericson
1977 Exchange Systems in Archaeological Perspective. In *Exchange Systems in Prehistory*, edited by Timothy K. Earle and Jonathon E. Ericson, pp. 3-12. Academic Press, New York.

Ellen, Roy
1982 *Environment, Subsistence and System: The Ecology of Small-Scale Social Formations.* Cambridge University Press, Cambridge.

Elliot, Daniel T.
1986 *The Live Oak Soapstone Quarry, DeKalb County, Georgia.* Garrow and Associates, Inc., Atlanta.

Ellsworth, I. J.
1934 The Forest Cover Type Map. Manuscript on file, Southeast Archeological Center, Tallahassee.

Faller, Adolph
1975 *The Plant Ecology of Mammoth Cave National Park, Kentucky.* Ph.D. dissertation, Indiana State University, Terre Haute.

Farnsworth, Kenneth B., and Thomas E. Emerson
1986 *Early Woodland Archeology.* Kampsville Seminars in Archeology, Vol. 2, Center for American Archeology Press, Kampsville, Illinois.

Faulkner, Charles H.
1978 Ceramics of the Owl Hollow Phase in South-Central Tennessee: A Preliminary Report. *Tennessee Anthropologist* 3:187-202.

Faulkner, Charles H., and J. B. Graham
1965 *Excavations in the Nickajack Reservoir: Season I.* University of Tennessee, Knoxville.

1966 *Westmoreland-Barber Site (40Mi11), Nickajack Reservoir, Season II.* University of Tennessee, Knoxville.

Flannery, Kent V.
1968 Archaeological Systems Theory and Early Mesoamerica. In *Anthropological Archaeology in the Americas*, edited by Betty J. Meggers, pp. 67-87. Anthropological Society of Washington, Washington, D.C.

Flannery, Kent V. (editor)
1976 *The Early Mesoamerican Village.* Academic Press, New York.

Flannery, Kent V., and Marcus C. Winter
1976 Analyzing Household Activities. In *The Early Mesoamerican Village*, edited by Kent V. Flannery, pp. 34-47. Academic Press, New York.

Foley, Robert
1977 Space and Energy: A Method for Analysing Habitat Value and Utilisation in Relation to Archaeological Sites. In *Spatial Archaeology*, edited by David L. Clarke, pp. 163-188. Academic Press, New York.

Ford, Richard I.
1981 Gardening and Farming before A.D. 1000: Patterns of Prehistoric Cultivation North of Mexico. *Journal of Ethnobiology* 1:6-27.

Ford, Richard I. (editor)
1985 *Prehistoric Food Production in North America*. Anthropological Papers 75. Museum of Anthropology, University of Michigan, Ann Arbor.

Fowke, Gerald
1922 Archeological Investigation. *Bureau of American Ethnology, Bulletin 76*. Smithsonian Institution, Washington, D.C.

Fowler, Melvin L.
1959 *Summary Report of Modoc Rock Shelter: 1952, 1953, 1955, 1956*. Illinois State Museum Reports of Investigations No. 8, Springfield.

1974 *Cahokia: Ancient Capital of the Midwest*. Addison-Wesley Module in Anthropology No. 48, Reading.

1978 Cahokia and the American Bottom: Settlement Archeology. In *Mississippian Settlement Patterns*, edited by Bruce D. Smith, pp. 455-478. Academic Press, New York.

Friedman, Jonathan
1975 Tribes, States, and Transformations. In *Marxist Analyses and Social Anthropology*, edited by Maurice Bloch, pp. 161-202. Malaby Press, London.

Futato, Eugene M.
1977 *The Bellefonte Site, 1 Ja 300*. University of Alabama, Office of Archaeological Research, Research Series No. 2, University.

Futato, Eugene M., and Carlos Solis
1983 *Archaeological Investigations at the B.B. Comer Bridge Site, 1 Ja 300, Jackson County, Alabama*. University of Alabama, Office of Archaeological Research, Research Series No. 31, University.

Gardner, Paul S.
1987 New Evidence Concerning the Chronology and Paleoethnobotany of Salts Cave, Kentucky. *American Antiquity* 52:358-366.

Gilbert, Robert I., Jr.
1977 Applications of Trace Element Research to Problems in Archeology. In *Biocultual Adaptation in Prehistoric America*, edited by Robert L. Blakely, pp 85-100. Southern Anthropological Society Proceedings, No. 11. University of Georgia Press, Athens.

Gifford, Diane P.
1982 Taphonomy and Paleoecology: A Critical Review of Archaeology's Sister Disciplines. In *Advances in Archaeological Method and Theory: Selections for Students, Volumes 1 through 4*, Edited by Michael B. Schiffer, pp. 465-538. Academic Press, New York.

Goad, Sharon I.
1979 Middle Woodland Exchange in the Prehistoric Southeastern United States. In *Hopewell Archaeology: The Chillicothe Conference*, edited by David S. Brose and N'omi Greber, pp. 239-246. The Kent State University Press, Kent.

Godelier, Maurice
1972 *Rationality and Irrationality in Economics*. Monthly Review Press, New York.

1973 *Perspectives in Marxist Anthropology*. Cambridge University Press, Cambridge.

1975 Modes of Production, Kinship, and Demographic Structures. In *Marxist Analyses and Social Anthropology*, edited by Maurice Bloch, pp. 3-27. Malaby Press, London. Aldine Press, Chicago.

1980a Anthropology and Economics: The Analysis of Production, Circulation, and Consumption of Economic Goods. In *People in Culture: A Survey of Cultural Anthropology*, edited by Ino Rossi, pp. 256-284. Praeger, New York.

1980b Forms and Conditions of Appropriation of the Means of Production. In *People in Culture: A Survey of Cultural Anthropology*, edited by Ino Rossi, pp. 285-312. Praeger, New York.

Gould, John P.
1986 Is the Rational Expectations Hypothesis Enough? In *Rational Choice*, edited by Robin M. Hogarth and Melvin W. Reder, pp. 187-193. University of Chicago Press, Chicago.

Gould, Richard A., and Patty Jo Watson
1982 A Dialog on the Meaning and Use of Analogy in Ethnoarchaeological Reasoning. *Journal of Anthropological Archaeology* 1(4):355-381.

Grayson, Donald K.
1979 On the Quantification of Vertebrate Archaeofaunas. In *Advances in Archaeological Method and Theory*, Vol. 2, edited by Michael B. Schiffer, pp. 199-237. Academic Press, New York.

Gremillion, Kristen J.
1990 Plant Remains from Ten Sites within Mammoth Cave National Park. In *Mammoth Cave Archeological Inventory Project Interim Report - 1989 Investigations*, edited by Guy Prentice, pp. 76-96. National Park Service, Southeast Archeological Center, Tallahassee.

1993 Plant Husbandry at the Archaic/Woodland Transition: Evidence from the Cold Oak Shelter, Kentucky. *Midcontinental Journal of Archaeology* 18:161-189.

Griffin, James B.
1967 Eastern North American Archaeology: A Summary. *Science* 156:175-91.

1983 The Midlands. In *Ancient North Americans*, edited by Jesse D. Jennings, pp. 243-301. W. H. Freeman and Co., New York.

Haag, William G.
1939 Southeast Archaeological Conference, *News Letter*, Vol. 1, No. 1, Lexington.

1974 Pottery from Indian Knoll. In *Indian Knoll*, edited by William S. Webb, pp. 356-362. University of Tennessee Press, Knoxville.

Hanson, Lee H., Jr.
1960 A Proposed Sequence of Occupation of Ceramic Sites in the Wolf Creek Reservoir. Manuscript on file, Museum of Anthropology, University of Kentucky, Lexington.

1970 *The Jewel Site, Bn 21, Barren County, Kentucky*. Tennessee Archaeological Society, Miscellaneous Paper No. 8.

Harrington, Jean C.
1946 Indian Graves Found Near Historic Entrance. Memorandum on file. Southeast Archeological Center, Tallahassee.

Harris, David R.
1972 Swidden Systems and Settlement. *In Man, Settlement, and Urbanism*, edited by P. J. Ucko, R. Tringham, and G. W. Dimbleby, pp. 245-262. Duckworth, London.

Harris, Marvin
1968 *The Rise of Anthropological Theory: A History of Theories of Culture*. Crowell Company, New York.

1971 *Culture, Man, and Nature: An Introduction to General Anthropology*. Crowell Company, New York.

1979 *Cultural Materialism: The Struggle for a Science of Culture*. Vintage Books, New York.

Hart, Keith
1982 On Commoditization. In *From Craft to Industry: The Ethnography of Proto-industrial Cloth Production*, edited by Ester N. Goody, pp. 38-49. Cambridge University Press, Cambridge.

Hassan, Fekri A.
1981 *Demographic Archeology*. Academic Press, New York.

Hawkes, Kristen
1987 How Much Food Do Foragers Need? In *Food and Evolution: Toward a Theory of Human Food Habits*, edited by Marvin Harris and Eric B. Ross, pp. 341-355. Temple University Press, Philadelphia.

Haytowitz, David B.
1984b *Composition of Foods: Vegetables and Vegetable Products: Raw, Processed, Prepared*. U.S. Department of Agriculture, Human Nutrition Information Service, Washington, D.C.

Heidenreich, Conrad E.
1978 Huron. In *Northeast*, edited by Bruce G. Trigger, 368-393. Handbook of North American Indians, Volume 15, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Herskovits, Melville J.
1952 *Economic Anthropology: The Economic Life of Primitive Peoples.* W. W. Norton and Company, New York.

Hiscock, John W.
1983 *An Investigation of a Possible Aboriginal Ladder in Mammoth Cave.* Manuscript on file. Southeast Archeological Center, Tallahassee.

Hodder, Ian
1982a *Symbolic and Structural Archaeology.* Cambridge University Press, Cambridge.

1982b *Symbols in Action: Ethnoarchaeological Studies of Material Culture.* Cambridge University Press, Cambridge.

1982c Toward a Contextual Approach to Prehistoric Exchange, In *Contexts for Prehistoric Exchange*, edited by Jonathon E. Ericson and Timothy K. Earle, pp. 199-211. Academic Press, New York.

1985 Postprocessual Archaeology, In *Advances in Archaeological Method and Theory*, Vol. 8, edited by Michael b. Schiffer, pp. 1-26. Academic Press, Orlando.

Hodder, Ian, and Clive Orton
1976 *Spatial Analysis in Archaeology.* Cambridge University Press, Cambridge.

Hoffman, Robert W.
1987 Taphonomy and Zooarcheology of Rockshelters of the Big South Fork Area of the Cumberland Plateau, Tennessee and Kentucky. Ph.D. dissertation, University of Tennessee, Knoxville.

Hoffman, Robert W., and Christopher Hays
1987 The Eastern Wood Rat (*Neotoma floridana*) as a Taphonomic Factor in Archaeological Sites. *Journal of Archaeological Science* 14:325-337.

Hoover, Frank, and Mike Wells
1978 Untitled manuscript on file. Southeast Archeological Center, Tallahassee.

Horvath, Elizabeth A.
1990 Trip report on file. Southeast Archeological Center, Tallahassee.

Hudson, Charles
1976 *The Southeastern Indians*. University of Tennessee Press, Knoxville.

Jarman, M. R.
1972 A Territorial Model for Archaeology: A Behavioural and Geographical Approach. In *Models in Archaeology*, edited by David L. Clarke, pp. 705-734. Methuen, London.

Jefferies, Richard W.
1990a A Technological and Functional Analysis of Middle Archaic Hafted Endscrapers from the Black Earth Site, Saline County, Illinois. *Midcontinental Journal of Archaeology* 115:3-36.

1990b Chapter 4: Archaic Period. In *The Archaeology of Kentucky: Past Accomplishments and Future Directions*, edited by David Pollack, pp. 143-246. State Historic Preservation Comprehensive Plan Report No. 1, Kentucky Heritage Council, Frankfort.

Jennings, Jesse D.
1974 *Prehistory of North America*. McGraw-Hill, New York.

Jochim, M. A.
1976 *Hunting-gathering, Subsistence and Settlement: A Predictive Model*. Academic Press, New York.

1979 Breaking Down the System: Recent Ecological Approaches in Archaeology. In *Advances in Archaeological Method and Theory, Vol. 2*, edited by Michael B. Schiffer, pp. 77-117. Academic Press, New York.

Johnson, Gregory A.
1977 Aspects of Regional Analysis in Archaeology. *Annual Review of Anthropology* 6:479-508.

Justice, Noel D.
1987 *Stone Age Spear and Arrow Points of the Midcontinental and Eastern United States: A Modern Survey and Reference*. Indiana University Press, Bloomington.

Kahn, Joel S.
1978 Marxist Anthropology and Peasant Economics: A Study of the Social Structures of Underdevelopment. In *The New Economic Anthropology*, edited by John Clammer, pp. 110-137. St Martin's Press, New York.

Kay, Marvin, Frances B. King, and Christine K. Robinson
1980 Cucurbits from Phillips Spring: New Evidence an Interpretations. *American Antiquity* 45:806-822.

Keegan, William F. (editor)
1987 *Emergent Horticultural Economies of the Eastern Woodlands*. Occasional Paper No. 7. Center for Archaeological Investigations, Southern Illinois University, Carbondale.

Keegan, William F., and Brian M. Butler
1987 The Microeconomic Logic of Horticultural Intensification in the Eastern Woodlands. In *Emergent Horticultural Economies of the Eastern Woodlands*, pp 109-127. Occasional Paper No. 7. Center for Archaeological Investigations, Southern Illinois University, Carbondale.

Keene, Arthur S.
1979 *Prehistoric Foraging in a Temperate Forest*. Academic Press, New York.

Keesing, Roger M., and Felix M. Keesing
1971 *New Perspectives in Cultural Anthropology*. Holt, Rinehart and Winston, New York.

Keller, John E.
1987 Prehistoric Subsistence and Hardwood Nut Yields. *Midcontinental Journal of Archaeology* 12:175-192.

Kerley, April L., Sheila C. Muething, and Kenneth C. Carstens
1978 An Appraisal and Recommendation of the John M. Nelson Archeological Collection, Mammoth Cave National Park Library, Mammoth Cave National Park, Kentucky. Manuscript on file. Southeast Archeological Center, Tallahassee.

King, Frances B.
1985 Early Cultivated Cucurbits in Eastern North America. In *Prehistoric Food Production in North America*, edited by Richard I. Ford, pp. 73-98. University of Michigan Museum of Anthropology, Anthropological Papers No. 75.

1987 The Evolutionary Effects of Plant Cultivation. In *Emergent Horticultural Economies of the Eastern Woodlands*, edited by William F. Keegan, pp. 51-65. Occasional Paper No. 7. Center for Archaeological Investigations, Southern Illinois University, Carbondale.

Kottak, Conrad P.
1982 *Cultural Anthropology*, Third Edition. Random House, New York.

Kramer, Carol
1979 An Archaeological View of a Contemporary Kurdish Village: Domestic Architecture, Household Size, and Wealth. In *Ethnoarchaeology: Implications of Ethnography for Archaeology*, edited by Carol Kramer, pp. 139-163. Columbia University Press, New York.

Latham, Earle E.
1969 *Soil Survey of Barren County, Kentucky*. United States Department of Agriculture, Soil Conservation Service, U.S. Government Printing Office, Washinton, D.C.

Leader, Jonathon
1988 Technological Continuities and Specialization in Prehistoric Metalwork in the Eastern United States. Ph.D. dissertation, Department of Anthropology, University of Florida, Gainesville.

LeClair, Edward E., Jr., and Harold K. Schneider (editors)
1968 *Economic Anthropology: Readings in Theory and Analysis*. Holt, Rinehart and Winston, New York.

Lewis, R. Barry
1988 New Deal Archaeology at Mississippian Sites in Kentucky. In *New Deal Era Archaeology and Current Research in Kentucky*, edited by David Pollack and Mary Lucas Powell, pp. 26-45. Kentucky Heritage Council, Lexington.

1990 Chapter 6: Mississippi Period. In *The Archaeology of Kentucky: Past Accomplishments and Future Directions*, edited by David Pollack, pp. 375-466. State Historic Preservation Comprehensive Plan Report No. 1, Kentucky Heritage Council, Frankfort.

Little, Elbert L.
1980 *The Audubon Society Field Guide to North American Trees, Eastern Region*. Alfred A. Knopf, New York.

Long, Norman, and Paul Richardson
1978 Informal Sector, Petty Commodity Production, and the Social Relations of Small-scale Enterprise. In *The New Economic Anthropology*, edited by John Clammer, pp. 176-209. St Martin's Press, New York.

Longacre, William A.
1968 Some Aspects of Prehistoric Society in East-Central Arizona. In *New Perspectives in Archaeology*, edited by Sally R. Binford and Lewis R. Binford, pp. 89-102. Aldine Press, Chicago.

Malinowski, Bronislaw
1984 *Argonauts of the Western Pacific: An Account of Native Enterprise and Adventure in the Archipelagoes of Melanesian New Guinea.* Waveland Press, Prospect Heights.

Manzano, Bruce L.
1989 Comparison of Lithic Assemblages from Two Upland Sites in Mammoth Cave National Park, Kentucky. Paper presented at the Southeast Archaeological Conference, Tampa.

1990 Lithic Analysis. In *Mammoth Cave Archeological Inventory Project Interim Report - 1989 Investigations*, edited by Guy Prentice, pp. 53-75. National Park Service, Southeast Archeological Center, Tallahassee.

Manzano, Bruce L., and Guy Prentice
1991 Population Estimates and Seasonal Nutritional Information for Freshwater Mussels within the Green River, Mammoth Cave National Park, Kentucky. Manuscript on file, Southeast Archeological Center, Tallahassee.

Marquardt, William H.
1974 A Statistical Analysis of Constituents in Human Paleofecal Specimens from Mammoth Cave. In *Archaeology of the Mammoth Cave Area*, edited by Patty Jo Watson, pp. 193-202. Academic Press, New York.

Marquardt, William H., and Patty Jo Watson
1983a Excavation and Recovery of Biological Remains from Two Archaic Shell Middens in Western Kentucky. Southeastern Archaeological Conference, *Bulletin* 20:112-129.

1983b The Shell Mound Archaic of Western Kentucky. In *Archaic Hunters and Gatherers in the American Midwest*, edited by James Phillips and James Brown, pp. 323-339. Academic Press, New York.

Marx, Karl
1904 *A Contribution to the Critique of Political Economy.* Kerr, Chicago.

1976 *Capital: A Critique of Political Economy*, vol. 1. International Publishers, New York.

Mason, Ronald J., and Gregory Perino
1961 Microblades at Cahokia, Illinois. *American Antiquity* 26: 553-557.

McBride, Kim A., and W. Stephen McBride
1990 Chapter 9: Historic Period Culture History. In *The Archaeology of Kentucky: Past Accomplishments and Future Directions, Vol. 2*, edited by David Pollack, pp. 583-747. Kentucky Heritage Council, Site Historic Preservation Comprehensive Plan Report No. 1. Frankfort.

McBride, Kevin A., and Robert E. Dewar
1987 Agriculture and Cultural Evolution: Causes and Effects in the lower Connecticut River Valley. In *Emergent Horticultural Economies of the Eastern Woodlands*, edited by William F. Keegan, pp. 305-328. Center for Archaeological Investigations, Occasional Paper No. 7, Southern Illinois University, Carbondale.

McCarthy, Marie A.
1984a *Composition of Foods: Nuts and Seed Products: Raw, Processed, Prepared.* U.S. Department of Agriculture, Human Nutrition Information Service, Washington, D.C.

Meehan, Betty
1982 *Shell Bed to Shell Midden.* Australian Institute of Aboriginal Studies, Canberra.

Meillassoux, Claude
1972 From Reproduction to Production: A Marxist Approach to Economic Anthropology. *Economy and Society* 1:93-105.

Meloy, Harold
1968 *Mummies of Mammoth Cave.* Micron, Shelbyville, Indiana.

Milanich, Jerald T., Ann S. Cordell, Vernon J. Knight, Jr., Timothy A. Kohler, and Brenda J. Sigler-Lavelle
1984 *McKeithen Weeden Island: The Culture of Northern Florida, A.D. 200-900.* Academic Press, Orlando.

Miller, Daniel, and Christopher Tilley
1984 Ideology, Power and Prehistory: An Introduction. In *Ideology, Power and Prehistory*, edited by Daniel Miller and Christopher Tilley, pp. 1-15. Cambridge University Press, Cambridge.

Mills, William C.
1902 Excavations of the Adena Mound. *Ohio Archaeological and Historical Quarterly* 10:451-479.

Milner, George R.
1980 Epidemic Disease in the Postcontact Southeast. *Midcontinental Journal of Archaeology* 5:39-56.

Moore, Clarence B.
1916 *Some Aboriginal Sites on Green River, Kentucky.* Journal of the Academy of Natural Sciences of Philadelphia, second series, vol. 16, part 3, pp. 431-487.

Moran, Emilio F.
1979 *Human Adaptability: An Introduction to Ecological Anthropology.* Westview Press, Boulder.

Moseley, Michael E.
1975 *The Maritime Foundations of Andean Civilization.* Benjamin/Cummings Publishing Co., Menlo Park, California.

Muller, Jon
1983 The Southeast. In *Ancient North Americans*, edited by Jesse D. Jennings, pp. 373-419. W. H. Freeman and Co., New York.

1984 Mississippian Specialization and Salt. *American Antiquity* 49:489-507.

1986 Pans and a Grain of Salt: Mississippian Specialization Revisited. *American Antiquity* 51:405-409.

1987 Salt, Chert, and Shell: Mississippian Exchange and Economy. In *Specialization, Exchange, and Complex Societies*, edited by Elizabeth M. Brumfiel and Timothy K. Earle, pp. 10-21. Cambridge University Press, Cambridge.

Munson, Patrick J., Kenneth B. Tankersley, Cheryl Ann Munson, and Patty Jo Watson
1989 Prehistoric Selenite and Satinspar Mining in the Mammoth Cave System, Kentucky. *Midcontinental Journal of Archaeology* 14:119-145.

Murray, Robert K., and Roger W. Brucker
1979 *Trapped!* G. P. Putnam's Sons, New York.

Naroll, Raoul
1962 Floor Area and Settlement Populations. *American Antiquity* 27:587-589.

Nassaney, Michael S.
1987 On the Causes and Consequences of Subsistence Intensification in the Mississippian Alluvial Valley. In *Emergent Horticultural Economies of the Eastern Woodlands*, edited by William F. Keegan, pp. 129-151. Center for Archaeological Investigations, Occasional Paper No. 7, Southern Illinois University, Carbondale.

National Park Service
1991 Engineering Report, Wastewater System, September 1991, Mammoth Cave National Park, Kentucky. Report on file, Mammoth Cave National Park, National Park Service, Kentucky.

Nelson, Nels C.
1916b Letter dated December 3, 1916 addressed to Dr. Wissler. Letter on file at the American Museum of Natural History, New York.

1917 *Contributions to the Archaeology of Mammoth Cave and Vicinity, Kentucky*. Anthropological Papers, American Museum of Natural History 22(1), New York.

Neumann, Georg K.
1937 The Human Remains from Mammoth Cave. Manuscript on file. Southeast Archeological Center, Tallahassee.

1938 The Human Remains from Mammoth Cave, Kentucky. *American Antiquity* 3:339-353.

Nimkoff, Meyer F., and Russel Middleton
1968 Types of Family and Types of Economy. In *Man in Adaptation: The Cultural Present*, edited by Jehudi Cohen, pp. 384-393. Aldine, Chicago.

Olsson, Gunner
1966 Central Place Systems, Spatial Interaction, and Stochastic Processes. *Papers and Proceedings of the Regional Science Association* 18:13-45.

O'Laughlin, Bridget
1975 Marxist Approaches in Anthropology. In *Annual Review of Anthropology* 4:341-370.

Orchard, William C.
1920 *Sandals and Other Fabrics from Kentucky Caves*. Indian Notes and Monographs. Museum of the American Indian, Heye Foundation, New York.

Palmer, Arthur N.
1981 *A Geological Guide to Mammoth Cave National Park*. Zephyrus Press, Teaneck, New Jersey.

Pauketat, Timothy R.
1989 Monitoring Mississippian Homestead Occupation Span and Economy Using Ceramic Refuse. *American Antiquity* 54:288-331.

Peacock, D. P. S.
1981 Archaeology, Ethnology, and Ceramic Production. In *Production and Distribution: A Ceramic Viewpoint*, edited by Hilary Howard and Elaine L. Morris, chpt. 11. BAR International Series 120, Oxford.

1982 *Pottery in the Roman World: An Ethnoarchaeological Approach.* Longman, New York.

Peebles, Christopher S., and Susan M. Kus
1977 Some Archaeological Correlates of Ranked Societies. *American Antiquity* 42:421-448.

Phillips, James L., and James A. Brown (editors)
1983 *Archaic Hunters and Gatherers in the American Midwest.* Academic Press, New York.

Phillips, Philip
1970 *Archaeological Survey in the Lower Yazoo Basin, Mississippi, 1949-1955.* Peabody Museum, Cambridge.

Poe, Charles B.
1979 Mammoth Cave National Park Childress Farm Rockshelters. Manuscript on file. Southeast Archeological Center, Tallahassee.

1980a Mammoth Cave National Park, Kentucky: Archeological Testing and Assessment of Proposed Childress Farm/Job Corps Civilian Conservation Center Relocation. Manuscript on file. Southeast Archeological Center, Tallahassee.

1980b Trip report on file. Southeast Archeological Center, Tallahassee.

Polanyi, Karl
1944 *The Great Transformation.* Farrar and Rinehart, New York.

1957 The Economy as an Instituted Process. In *Trade and Market in the Early Empires*, edited by Karl Polanyi, Conrad M. Arensberg, and Harry W. Pearson, pp. 243-270. The Free Press, Glencoe, Illinois.

1968 *Primitive, Archaic and Modern Economies*, edited by George Dalton. Anchor Books, Garden City.

Polanyi, Karl, Conrad M. Arensberg, and Harry W. Pearson (eds.)
1957 *Trade and Market in the Early Empires*. The Free Press, Glencoe, Illinois.

Pond, Alonzo W.
1935a A Report on the Archaeological Studies at Mammoth Cave, Kentucky; June 10, 1935 to September 18, 1935. Unpublished manuscript on file. Southeastern Archeological Center, Tallahassee.

1935b Narrative Concerning Discovery of Lost John. Manuscript on file. Southeast Archeological Center, Tallahassee.

1935c Report of Preliminary Survey of Important Archaeological Discovery at Mammoth Cave, Kentucky. *Wisconsin Archeologist* 15:27-35.

1937 Lost John of Mummy Ledge. *Natural History* 39:176-184.

Porter, James W.
1973 The Mitchell Site and Prehistoric Exchange Systems at Cahokia: A.D. 1000+30. In *Explorations into Cahokia Archaeology*, edited by Melvin L. Fowler, pp. 137-164. Bulletin 7, Illinois Archaeological Survey, Urbana.

Prattis, J. Iain
1989 Alternative Views of Economy in Economic Anthropology. In *Beyond the New Economic Anthropology*, edited by John Clammer, pp. 8-44. Macmillan Press, London.

Prentice, Guy
1981 Cottage Industries as Mississippian Economic Phenomena and their Detection in the Archeological Record. Paper presented at the Midwest Archaeological Conference, Madison.

1983 Cottage Industries: Concepts and Implications. *Midcontinental Journal of Archaeology* 8:17-48.

1985 Economic Differentiation among Mississippian Farmsteads. *Midcontinental Journal of Archaeology* 10:77-122.

1986a Origins of Plant Domestication in the Eastern United States: Promoting the Individual in Archaeological Theory. *Southeastern Archaeology* 5:103-119.

1986b A Review of Structural Archaeology. *The Florida Journal of Anthropology*:11:1-14.

1986c Symbolism of the Birger Figurine. *American Antiquity* 51:239-266.

1987 Marine Shells as Wealth Items in Mississippian Societies. *Midcontinental Journal of Archaeology* 12:193-223.

1988 *Mammoth Cave Archeological Inventory Project Interim Report - 1987 Investigations*. National Park Service, Southeast Archeological Center, Tallahassee.

1989a Developing a Site Distribution Model for Mammoth Cave National Park, Kentucky. Paper presented at the 1989 Southeast Archaeological Conference, Tampa.

1989b *Mammoth Cave Archeological Inventory Project Interim Report - 1988 Investigations*. National Park Service, Southeast Archeological Center, Tallahassee.

1989c START: A Computerized Artifact Analysis and Reporting Program. *CRM Bulletin 12 (No. 3)*:23-24.

1990a *Mammoth Cave Archeological Inventory Project Interim Report - 1989 Investigations*. National Park Service, Southeast Archeological Center, Tallahassee.

1990b Prehistoric Ceramic Analysis. In *Mammoth Cave Archeological Inventory Project Interim Report - 1989 Investigations*, edited by Guy Prentice, pp. 41-52. National Park Service, Southeast Archeological Center, Tallahassee.

1993 *Archeological Overview and Assessment of Mammmoth Cave National Park*. National Park Service, Southeast Archeological Center, Tallahassee.

Prentice, Guy, and Mark Mehrer

1981 The Lab Woofie Site (11-S-346): An Unplowed Mississippian Site in the American Bottom Region of Illinois. *Midcontinental Journal of Archaeology* 6:33-53.

Price, Douglas T., and James A. Brown (editors)

1988 *Prehistoric Hunter-Gatherers*. Academic Press, Orlando.

Putnam, Frederic W.
1875 Archaeological Researches in Kentucky and Indiana. *Proceedings of the Boston Society of Natural History for 1874-1875* 17:314-332.

1876 List of additions to the Museum. In *8th Annual Report of of the Trustees of the Museum of American Museum of Archaeology and Ethnology* 1, 1868-1876:47-50.

1973 *The Archaeological Reports of Frederic Ward Putnam: Selected from the Annual Reports of the Peabody Museum of Archaeology and Ethnology, Harvard University 1875-1903*. AMS Press, New York.

Rafinesque, Constantine S.
1824 *Ancient History, or Annals of Kentucky: Introduction to the History and Antiquities of the State of Kentucky*. n.p., Frankfort.

Rappaport, Roy A.
1968 *Pigs for the Ancestors: Ritual in the Ecology of a New Guinea People*. Yale University Press, New Haven.

Reidhead, Van A.
1981 *A Linear Programming Model of Prehistoric Subsistence Optimization: A Southeastern Indiana Example*. Indiana Historical Society, Indianapolis.

Renfrew, Colin
1975 Trade as Action at a Distance: Questions of Integration and Communication. In *Ancient Civilization and Trade*, edited by Jeremy A. Sabloff and C. C. Lamberg-Karlovsky, pp. 3-59. University of New Mexico Press, Albuquerque.

1977 Alternative Models for Exchange and Spacial Distribution. In *Exchange Systems in Prehistory*, edited by Timothy K. Earle and Jonathon E. Ericson, pp. 71-90, Academic Press, New York.

Rey, P.
1975 *The Lineage Mode of Production*. Critique of Anthropology 3.

Rice, Prudence M.
1981 Evolution of Specialized Pottery Production: A Trial Model. *Current Anthropology* 22:219-227.

Robbins, Lionel
1932 *An Essay on the Nature and Significance of Economic Science*. St. Martin's Press, New York.

Robbins, Louise M.
1971 A Woodland "Mummy" from Salts Cave, Kentucky. *American Antiquity* 36:200-206.

1974 Prehistoric People of the Mammoth Cave Area. In *Archeology of the Mammoth Cave Area*, edited by Patty Jo Watson, pp. 137-162. Academic Press, New York.

Rolingson, Martha
1967 Temporal Perspective on the Archaic Cultures of the Middle Green River Region, Kentucky. Ph.D. dissertation, Department of Anthropology, University of Michigan, Ann Arbor.

Roper, Donna C.
1979 The Method and Theory of Site Catchment Analysis: A Review. In *Advances in Archaeological Method and Theory*, vol. 2., edited by Michael B. Schiffer, pp. 119-140. Academic Press, New York.

Ross, Eric B.
1987 An Overview of Trends in Dietary Varitation from Hunter-Gatherer to Modern Capitalist Societies. In *Food and Evolution: Toward a Theory of Human Food Habits*, edited by Marvin Harris and Eric B. Ross, pp. 7-55. Temple University Press, Philadelphia.

Sahlins, Marshall D.
1963 Poor Man, Rich Man, Big Man, Chief: Political Types in Melanesia and Polynesia. *Comparative Studies in Society and History* 5:285-300.

1972 *Stone Age Economics*. Aldine Press, Chicago.

1976 *Culture and Practical Reason*. University of Chicago Press, Chicago.

Sauer, Carl O.
1969 *Seeds, Spades, Hearths, and Herds: The Domestication of Animals and Foodstuffs*. 2nd edition. Massachusetts Institute of Technology Press, Cambridge.

Schiffer, William B.
1976 *Behavioral Archeology*. Academic Press, New York.

Schneider, Harold K.
1974 *Economic Man*. Free Press, Glencoe.

1975 Economic Development and Anthropology. *Annual Review of Anthropology* 4:271-292.

Schock, Jack M.
1987 *Prehistoric Indians of Southern Kentucky*. Arrow Enterprises, Bowling Green.

Schock, Jack M., and Michael Dowell
1981 The Early Woodland Period in South-Central Kentucky. Paper presented at the annual meeting of the Kentucky Archaeological Association, Bowling Green.

Schoeninger, Margaret J., and Christopher S. Peebles
1981 Notes on the Relationship Between Social Status and Diet at Moundville. *Southeastern Archaeological Conference Bulletin* 24:96-97.

Schoenwetter, James
1974 Pollen Analysis of Human Paleofeces from Upper Salts Cave. In *Archeology of the Mammoth Cave Area*, edited by Patty Jo Watson, pp. 49-58. Academic Press, New York.

Schwartz, Douglas W.
1958a The Archaeology of Mammoth Cave National Park. Manuscript on file, Mammoth Cave National Park Library, Mammoth Cave, Kentucky.

1958b Archaeological Report on Materials in the John M. Nelson Collection from Mammoth Cave National Park. Manuscript on file, Mammoth Cave National Park Library, Mammoth Cave, Kentucky.

1958c An Archeological Report on Physical Remains from Mammoth Cave National Park. Manuscript on file, Mammoth Cave National Park Library, Mammoth Cave, Kentucky.

1958d Archaeological Survey of Mammoth Cave National Park. Manuscript on file, Mammoth Cave National Park Library, Mammoth Cave, Kentucky.

1958e Description and Analysis of Museum Materials from Mammoth Cave National Park. Manuscript on file, Mammoth Cave National Park Library, Mammoth Cave, Kentucky.

1958f Report on Two Radiocarbon Dates from Mammoth Cave Kentucky. Manuscript on file, Mammoth Cave National Park Library, Mammoth Cave, Kentucky.

1958g Sandals and Textiles from Mammoth Cave National Park. Manuscript on file, Mammoth Cave National Park Library, Mammoth Cave, Kentucky.

1958h Summary and Evaluation of the 1916 American Museum Archaeological Work in Mammoth Cave National Park. Manuscript on file, Mammoth Cave National Park Library, Mammoth Cave, Kentucky.

1960 Prehistoric Man in Mammoth Cave. *Scientific American 203.*

1965 *Prehistoric Man in Mammoth Cave.* Eastern National Park and Monument Association. Interpretive Series, No. 2.

1967 *Conceptions of Kentucky Prehistory: A Case Study in the History of Archeology.* Studies in Anthropology 6, University of Kentucky Press, Lexington.

Seeman, Mark F.

1979a Feasting with the Dead: Ohio Hopewell Charnel House Ritual as a Context for Redistribution. In *Hopewell Archaeology: The Chillicothe Conference*, edited by David S. Brose and N'omi Greber, pp. 39-46. Kent State University Press, Kent.

1979b *The Hopewell Interaction Sphere: The Evidence for Interregional Trade and Structural Complexity.* Indiana Historical Society, Prehistory Research Series, Vol. 5, No. 2. Indiana Historical Society, Indianapolis.

1986 Adena 'Houses' and their Implications for Early Woodland Settlement Models in the Ohio Valley. In *Early Woodland Archeology*, edited by Kenneth B. Farnsworth and Thomas E. Emerson, pp. 564-580. Center for American Archeology, Kampsville.

Service, Elman R.
1962 *Primitive Social Organization: An Evolutionary Perspective.* Random House, New York.

Shepard, Anna O.
1971 *Ceramics for the Archaeologist.* Carnegie Institution of Washington, Washington, D.C.

Sloan, Tacoma G., and Douglas W. Schwartz
1960 Archeological Base Map and Survey of Mammoth Cave National Park. Manuscript on file, Southeast Archeological Center, Tallahassee.

Smith, Bruce D.
1975 *Middle Mississippian Exploitation of Animal Populations.* Museum of Anthropology, University of Michigan, Anthropological Papers 57, Ann Arbor.

1978 Variation in Mississippian Settlement Patterns. In *Mississippian Settlement Patterns*, edited by Bruce D. Smith, pp. 479-503. Academic Press, New York.

1986 The Archaeology of the Southeastern United States: From Dalton to de Soto, 10,500-500 B.P. *Advances in World Archaeology*, Vol. 5:1-92.

1987 Independent Domestication of Indigenous Seed-Bearing Plants in Eastern North America. In *Emergent Horticultural Economies of the Eastern Woodlands*, edited by William F. Keegan, pp. 3-47. Occasional Paper No. 7, Center for Archaeological Investigations, Southern Illinois University, Carbondale.

1989 Origins of Agriculture in Eastern North America. *Science* 246:1566-1571.

Smith, Bruce D. (editor)
1978 *Mississippian Settlement Patterns.* Academic Press, New York.

Smith, Marvin T.
1987 *Archaeology of Aboriginal Culture Change in the Interior Southeast: Depopulation During the Early Historic Period.* Ripley P. Bullen Monographs in Anthropology and History No. 6, The Florida State Museum, University of Florida Press, Gainesville.

Smith, Timothy J.
1983 Wampum as Primitive Valuables. In *Research in Economic Anthropology* 5:225-246.

Stein, Julie K.
1982 Geoarchaeology of the Green River Shell Middens. *Southeastern Archaeology* 1:24-39.

Steponaitis, Vincas P.
1978 Location Theory and Complex Chiefdoms: A Mississippian Example. In *Mississippian Settlement Patterns*, edited by Bruce D. Smith, pp. 417-453. Academic Press, New York.

1986 Prehistoric Archaeology in the Southeastern United States, 1970-1985. *Annual Review of Anthropology* 15:363-404.

Steward, Julian H.
1972 *Theory of Culture Change: The Methodology of Multilinear Evolution.* University of Illinois Press, Urbana.

Styles, Bonnie W.
1981 *Faunal Exploitation and Resource Selection: Early Late Woodland Subsistence in the Lower Illinois Valley.* Scientific Papers No. 3, Northwestern University Archeological Program, Evanston.

Swanton, John R.
1946 *The Indians of the Southeastern United States.* Bureau of American Ethnology, Bulletin 137. Smithsonian Institution, Washington, D.C.

Tainter, Joseph A.
1975 The Archaeological Study of Social Change: Woodland Systems in West-central Illinois. Ph.D. dissertation, Department of Anthropology, Northwestern University, Evanston.

Tankersley, Kenneth B.
1988 *The Paleoindian Period in Kentucky: Directions of Research - Past, Present, and Future*. Manuscript on file. Southeast Archeological Center, Tallahassee.

1989 Prehistoric Renewable Resource Mining in the Mammoth Cave System. Paper presented at the 1989 Southeast Archaeological Conference, Tampa.

Tankersley, Kenneth B., John L. Bassett, and Samuel S. Frushour
1985 A Gourd Bowl from Salts Cave, Kentucky. *Tennessee Anthropologist* 10:95-104.

Terray, Emmanuel
1972 *Marxism and "Primitive" Societies*. Monthly Review Press, New York. Translated from the 1969 French original *Le Marxisme devant les Societes "Primitives"* by Mary Klopper.

1975 Classes and Class Consciousness in the Abron Kingdom of Gyaman. In *Marxist Analyses and Social Anthropology*, edited by Maurice Bloch, pp. 85-135. Malaby Press, London.

Thieme, Donald M.
1991 Season Specialization, Assemblage Diversity, and the Concept of a Subsistence-Settlement System: A Statistical Analysis of the Riverton Culture. *Midcontinental Journal of Archaeology* 16:85-117.

Thwaites, Reuben G. (editor)
1959 *The Jesuit Relations and Allied Documents: Travels and Explorations of the Jesuit Missionaries in New France 1610-1791*, vol. 8. Pageant, New York.

Tourtellot, Gair
1983 An Assessment of Classic Maya Household Composition. In *Prehistoric Settlement Patterns: Essays in Honor of Gordon R. Willey*, edited by Evon Z. Vogt and Richard M. Leventhal, pp. 35-54. University of New Mexico Press and Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.

Trigger, Bruce
1968 The Determinants of Settlement Patterns. In *Settlement Archaeology*, edited by K. C. Chang, pp. 53-78. National Press Books, Palo Alto.

U.S. Forest Service
1948 *Woody-Plant Seed Manual.* U. S. Forest Service, Department of Agriculture, Misc. Publication No. 654. U.S. Government Printing Office, Washington, D.C.

Vayda, Andrew P.
1969 Expansion and Warfare among Swidden Agriculturalists. In *Environment and Cultural Behavior, Studies in Cultural Anthropology*, edited by Andrew P. Vayda, pp. 202-220. Natural History Press, Garden City, New York.

Vayda, Andrew P. (editor)
1969 *Environment and Cultural Behavior: Ecological Studies in Cultural Anthropology.* Natural History Press, Garden City.

Vayda, Andrew P., and Bonnie McCay
1975 New Directions in Ecology and Ecological Anthropology. *Annual Review of Anthropology* 4:293-306.

Vayda, Andrew P., and Roy A. Rappaport
1968 Ecology, Cultural and Non-cultural. In *Introduction to Cultural Anthropology*, edited by James A. Clifton, pp. 477-497. Houghton-Mifflin, Boston.

Vita-Finzi, C., and E. S. Higgs
1970 Prehistoric Economy in the Mount Carmel Area of Palestine: Site Catchment Analysis. *Proceedings of the Prehistoric Society* 36:1-37.

von Thunen, Johann H.
1875 *Der Isolierte Staat in Beziehung auf Landwirtschaft und Nationalokonomie.* (3rd. edition). Hamburg. Originally published 1826.

Wagner, Gail
1978 An Archeobotanical Analysis of Five Sites in the Mammoth Cave Area. Masters thesis, Department of Anthropology, Washington University, St. Louis.

Walker, John W.
1980 Mammoth Cave National Park, Kentucky: Known Archeological Sites Which Might Be Directly or Indirectly Affected by the Development of Trails in the Northwestern Part of the Park. Manuscript on file. Southeast Archeological Center, Tallahassee.

Walthall, John A.
1980 *Prehistoric Indians of the Southeast: Archaeology of Alabama and the Middle South*. University of Alabama Press, University.

Walthall, John A., Stephen H. Stow, and Marvin J. Karson
1979 Ohio Hopewell Trade: Galena Procurement and Exchange. In *Hopewell Archaeology: The Chillicothe Conference*, edited by David S. Brose and N'omi Greber, pp. 247-250. The Kent State University Press, Kent.

1980 Copena Galena: Source Identification and Analysis. *American Antiquity* 45:21-42.

Watson, Patty Jo
1966 Prehistoric Miners of Salts Cave, Kentucky. *Archaeology* 19(4).

1985 The Impact of Early Horticulture in the Upland Drainages of the Midwest and Midsouth. In *Prehistoric Food Production in North America*, edited by Richard I. Ford, pp. 99-148. University of Michigan Museum of Anthropology, Anthropological Papers No. 75.

1990 Trend and Tradition in Southeastern Archaeology. *Southeastern Archaeology* 9:43-54.

Watson, Patty Jo (editor)
1969 *The Prehistory of Salts Cave, Kentucky*. Illinois State Museum, Reports of Investigations, No. 16, Springfield.

1974 *Archaeology of the Mammoth Cave Area*. Academic Press, New York.

Watson, Patty Jo, and Kenneth C. Carstens
1975 *Archaeological Resources of Mammoth Cave National Park: A Brief Summary*. Report prepared for the National Park Service, July, Tallahassee.

1982 Archaeological Survey and Testing in Mammoth Cave National Park, Ky. Manuscript on file, Southeast Archeological Center, Tallahassee.

Watson, Patty Jo, and Mary Kennedy
1988 The Development of Horticulture in the Eastern Woodlands of North America: Women's Role. Paper presented at the Women and Production in Prehistory Conference, The Wedge Plantation, South Carolina.

Webb, William S.
1939 *An Archaeological Survey of Wheeler Basin on the Tennessee River in Northern Alabama*. Bureau of American Ethnology, Bulletin 122. U.S. Government Printing Office, Washington, D.C.

1950a *The Carlson Annis Mound*. Reports in Anthropology 7 (No. 4). University of Kentucky, Lexington.

1950b *The Read Shell Midden*. Reports in Anthropology 7 (No. 5). University of Kentucky, Lexington.

1974 *Indian Knoll*. The University of Tennessee Press, Knoxville.

Webb, William S., and William G. Haag
1939 *The Chiggerville Site*. Reports in Anthropology 4 (No. 1). University of Kentucky, Lexington.

1940 *Cypress Creek Villages*. Reports in Anthropology 4 (No. 2). University of Kentucky, Lexington.

1947 *Archaic Sites in McLean County Kentucky*. Reports in Anthropology 7 (No. 11). University of Kentucky, Lexington.

Webb, William S., and DeJarnette
1942 *An Archaeological Survey of Pickwick Basin*. Bureau of American Ethnology, Bulletin 122. U.S. Government Printing Office, Washington, D.C.

Webb, William S., and Charles G. Wilder
1951 *An Archaeological Survey of Guntersville Basin on the Tennessee River in Northern Alabama*. University of Kentucky Press, Lexington.

Webb, William S., and W. D. Funkhouser
1932 *Archaeological Survey of Kentucky*. University of Kentucky, Reports in Archaeology and Anthropology, Vol. II. Department of Anthropology and Archaeology, University of Kentucky, Lexington.

Weismantel, M. J.
1989 Making Breakfast and Raising Babies: The Zumbagua Household as Constituted Process. In *The Household Economy: Reconsidering the Domestic Mode of Production*, edited by Richard R. Wilk, pp. 55-72. Westview Press, Boulder.

Wenke, Robert J.
1981 Explaining the Evolution of Cultural Complexity: A Review. In *Advances in Archaeological Method and Theory*, Volume 4, edited by Michael B. Schiffer, pp. 79-127. Academic Press, New York.

White, Leslie A.
1959 *The Evolution of Culture: The Development of Civilization to the Fall of Rome*. McGraw Hill Book Company, New York.

White, Vernon
1980 Archaeological Survey and Study of Hominy Holes in Kentucky. *Kentucky Archaeological Association Bulletin* 14 & 15:1-63.

Wilk, Richard R.
1989 Decision Making and Resource Flows Within the Household: Beyond the Black Box. In *The Household Economy: Reconsidering the Domestic Mode of Production*, edited by Richard R. Wilk, pp. 23-54. Westview Press, Boulder.

Wilk, Richard R. (editor)
1989 *The Household Economy: Reconsidering the Domestic Mode of Production*. Westview Press, Boulder.

Willey, Gordon R.
1977 A Consideration of Archaeology. *Daedalus* 106(3):81-96.

Willey, Gordon R., and Jeremy A. Sabloff
1980 *A History of American Archaeology*. W. H. Freeman, San Francisco.

Wing, Elizabeth, and Antoinette B. Brown
1979 *Paleonutrition: Method and Theory in Prehistoric Foodways*. Academic Press, New York.

Winterhalder, Bruce

1977 Foraging Strategy Adaptations of the Boreal Forest Cree: An Evaluation of Theory and Models from Evolutionary Ecology. Ph.D. Dissertation, Department of Anthropology, Cornell University.

1980 Environmental Analysis in Human Evolution and Adaption Research. *Human Ecology* 8:135-170.

1987 The Analysis of Hunter-Gatherer Diets: Stalking an Optimal Foraging Model In *Food and Evolution: Toward a Theory of Human Food Habits*, edited by Marvin Harris and Eric B. Ross, pp. 311-339. Temple University Press, Philadelphia.

Winterhalder, Bruce, and Eric A. Smith (editors)

1981 *Hunter-gatherer Foraging Strategies*. University of Chicago Press, Chicago.

Winters, Howard D.

1968 Value Systems and Trade Cycles of the Late Archaic in the Midwest. In *New Perspectives in Archaeology*, edited by Sally R. Binford and Lewis R. Binford, pp. 175-222. Aldine Publishing, Chicago.

1969 *The Riverton Culture*. Illinois Archaeological Survey, Monograph 1, Illinois State Museum, Reports of Investigations, No. 13, Springfield.

1974 Introduction to the New Edition. In *Indian Knoll*, by William S. Webb, pp. v-xxvii. The University of Tennessee Press, Knoxville.

Witthoft, John

1949 *Green Corn Ceremonialism in the Eastern Woodlands*. Museum of Anthropology Contributions 13. University of Michigan, Ann Arbor.

Yarnell, Richard A.

1969 Contents of Human Paleofeces. In *The Prehistory of Salts Cave, Kentucky*, by Patty Jo Watson, et al., pp. 41-53. Illinois State Museum Reports of Investigations, No. 16., Illinois State Museum, Springfield.

1974a Intestinal Contents of the Salts Cave Mummy and Analysis of the Initial Salts Cave Flotation Series. In *Archaeology of the Mammoth Cave Area*, edited by Patty Jo Watson, pp. 109-112. Academic Press, New York. Illinois State Museum, Springfield.

1974b Plant Foods and Cultivation of the Salts Cavers. In *Archaeology of the Mammoth Cave Area*, edited by Patty Jo Watson, pp. 113-122. Academic Press, New York.

1978 Domestication of Sunflower and Sumpweed in Eastern North America. In *The Nature and Status of Ethnobotany*, edited by Richard I. Ford, pp. 289-300. University of Michigan, Museum of Anthropology, Anthropological Papers No. 67.

Yarnell, Richard A., and M. Jean Black

1985 Temporal Trends Indicated by a Survey of Archaic and Woodland Plant Food Remains from Southeastern North America. *Southeastern Archaeology* 4:93-106.

Yerkes, Richard W.

1983 Microwear, Microdrills, and Mississippian Craft Specialization. *American Antiquity* 48:499-518.

1986 Licks, Pans, and Chiefs: A Comment on "Mississippian Specialization and Salt." *American Antiquity* 51:402-404.

Young, Bennett H.

1897 Rivals the Mammoth Cave in Grandeur. *Louisville Courier-Journal*, Section 3, August 15, 1897: 1.

1910 *The Prehistoric Men of Kentucky*. Filson Club Publications, No. 25. John P. Morton, Louisville.

Young, Jon N.

1962 *Annis Mound: A Late Prehistoric Site on the Green River*. Master's thesis, Department of Anthropology, University of Kentucky, Lexington.

APPENDIX I

LINEAR PROGRAMMING EXAMPLES

```
//R137FFAL JOB (,,5,1),PRENTICE,CLASS=2,
//       USER=POTTERY,PASSWORD=
/*ROUTE PRINT NER.R0
// EXEC SAS
DATA;
  INPUT _TYPE_ $ @10 _COL_ $13. @24 _ROW_ $16. _COEF_;
  CARDS;
MIN       .              COST              .
GE        .              KCALORIES         .
GE        .              PROTEIN           .
GE        .              CALCIUM           .
GE        .              PHOSPHORUS        .
GE        .              IRON              .
GE        .              VITAMIN_A         .
GE        .              THIAMIN           .
GE        .              RIBOFLAVIN        .
GE        .              NIACIN            .
GE        .              ASCORBIC          .
UPPERBD   .              AVAILABLE         .
.         BEARFABL       ASCORBIC          1.300000
.         BEARFABL       AVAILABLE         0.166295
.         BEARFABL       CALCIUM           9.000000
.         BEARFABL       COST              328.000000
.         BEARFABL       IRON              2.200000
.         BEARFABL       KCALORIES         334.170000
.         BEARFABL       NIACIN            5.050000
.         BEARFABL       PHOSPHORUS        158.000000
.         BEARFABL       PROTEIN           17.000000
.         BEARFABL       RIBOFLAVIN        0.340000
.         BEARFABL       THIAMIN           0.620000
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.         BEARFAFL       ASCORBIC          1.300000
.         BEARFAFL       AVAILABLE         0.044115
.         BEARFAFL       CALCIUM           9.000000
.         BEARFAFL       COST              328.000000
.         BEARFAFL       IRON              2.200000
.         BEARFAFL       KCALORIES         334.170000
.         BEARFAFL       NIACIN            5.050000
.         BEARFAFL       PHOSPHORUS        158.000000
.         BEARFAFL       PROTEIN           17.000000
.         BEARFAFL       RIBOFLAVIN        0.340000
.         BEARFAFL       THIAMIN           0.620000
.         BEARFAFL       VITAMIN_A         551.000000
.         BEARFAUP       ASCORBIC          1.300000
.         BEARFAUP       AVAILABLE         0.159810
.         BEARFAUP       CALCIUM           9.000000
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.         BEARFAUP       IRON              2.200000
.         BEARFAUP       KCALORIES         334.170000
.         BEARFAUP       NIACIN            5.050000
.         BEARFAUP       PHOSPHORUS        158.000000
.         BEARFAUP       PROTEIN           17.000000
.         BEARFAUP       RIBOFLAVIN        0.340000
.         BEARFAUP       THIAMIN           0.620000
.         BEARFAUP       VITAMIN_A         551.000000
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.         BEARSPBL       CALCIUM           12.000000
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.         BEARSPBL       KCALORIES         134.290000
.         BEARSPBL       NIACIN            6.820000
.         BEARSPBL       PHOSPHORUS        213.000000
.         BEARSPBL       PROTEIN           23.000000
.         BEARSPBL       RIBOFLAVIN        0.470000
.         BEARSPBL       THIAMIN           0.850000
.         BEARSPBL       VITAMIN_A         551.000000
.         BEARSPFL       ASCORBIC          1.300000
.         BEARSPFL       AVAILABLE         0.032975
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.	BEARSPFL	CALCIUM	12.000000
.	BEARSPFL	COST	475.000000
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.	BEARSPFL	NIACIN	6.820000
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.	BEARSPFL	PROTEIN	23.000000
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.	BEARSPUP	PROTEIN	23.000000
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.	BEARSUFL	KCALORIES	214.240000
.	BEARSUFL	NIACIN	6.060000
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.	BEARSUFL	PROTEIN	20.600000
.	BEARSUFL	RIBOFLAVIN	0.420000
.	BEARSUFL	THIAMIN	0.760000
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.	BEARSUUP	THIAMIN	0.760000
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.	BEAVERFARI	COST	170.000000
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.	BEAVERFARI	RIBOFLAVIN	0.390000
.	BEAVERFARI	THIAMIN	0.100000

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BEAVERSPRI	AVAILABLE	0.008570
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BEAVERSPRI	COST	205.000000
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BEAVERSPRI	NIACIN	5.050000
BEAVERSPRI	PHOSPHORUS	158.000000
BEAVERSPRI	PROTEIN	21.300000
BEAVERSPRI	RIBOFLAVIN	0.390000
BEAVERSPRI	THIAMIN	0.100000
BEAVERSPRI	VITAMIN_A	1101.000000
BEAVERSURI	ASCORBIC	1.800000
BEAVERSURI	AVAILABLE	0.008570
BEAVERSURI	CALCIUM	9.000000
BEAVERSURI	COST	205.000000
BEAVERSURI	IRON	2.200000
BEAVERSURI	KCALORIES	200.100000
BEAVERSURI	NIACIN	5.050000
BEAVERSURI	PHOSPHORUS	158.000000
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BEAVERSURI	RIBOFLAVIN	0.390000
BEAVERSURI	THIAMIN	0.100000
BEAVERSURI	VITAMIN_A	1101.000000
BERRIESUFL	ASCORBIC	21.000000
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BERRIESUFL	PHOSPHORUS	10.000000
BERRIESUFL	PROTEIN	1.200000
BERRIESUFL	RIBOFLAVIN	0.040000
BERRIESUFL	THIAMIN	0.030000
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BLACKCSUFL	ASCORBIC	10.000000
BLACKCSUFL	AVAILABLE	72.198500
BLACKCSUFL	CALCIUM	22.000000
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BLACKCSUFL	IRON	0.400000
BLACKCSUFL	KCALORIES	69.520000
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BLACKCSUFL	THIAMIN	0.050000
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BOXTURFAFL	PROTEIN	18.200000
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BOXTURFAUP	ASCORBIC	1.700000
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BOXTURFAUP	CALCIUM	107.000000
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BOXTURFAUP	NIACIN	4.800000
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BOXTURFAUP	THIAMIN	0.240000
BOXTURFAUP	VITAMIN_A	1652.000000
C_PODSFAFL	ASCORBIC	0.000000
C_PODSFAFL	AVAILABLE	577.790160
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C_PODSFAFL	KCALORIES	362.690000
C_PODSFAFL	NIACIN	1.470000
C_PODSFAFL	PHOSPHORUS	442.000000
C_PODSFAFL	PROTEIN	12.600000
C_PODSFAFL	RIBOFLAVIN	6.430000
C_PODSFAFL	THIAMIN	0.650000
C_PODSFAFL	VITAMIN_A	20.000000
DEERFAUP	ASCORBIC	1.500000
DEERFAUP	AVAILABLE	1.767090
DEERFAUP	CALCIUM	8.000000
DEERFAUP	COST	83.000000
DEERFAUP	IRON	2.200000
DEERFAUP	KCALORIES	265.550000
DEERFAUP	NIACIN	5.290000
DEERFAUP	PHOSPHORUS	209.000000
DEERFAUP	PROTEIN	17.600000
DEERFAUP	RIBOFLAVIN	0.430000
DEERFAUP	THIAMIN	0.200000
DEERFAUP	VITAMIN_A	826.000000
DEERSPFL	ASCORBIC	0.000000
DEERSPFL	AVAILABLE	0.406635
DEERSPFL	CALCIUM	10.000000
DEERSPFL	COST	132.000000
DEERSPFL	IRON	2.600000
DEERSPFL	KCALORIES	125.750000
DEERSPFL	NIACIN	6.300000
DEERSPFL	PHOSPHORUS	249.000000
DEERSPFL	PROTEIN	21.000000
DEERSPFL	RIBOFLAVIN	0.510000
DEERSPFL	THIAMIN	0.230000
DEERSPFL	VITAMIN_A	826.000000
DEERSUFL	ASCORBIC	1.500000
DEERSUFL	AVAILABLE	0.412020
DEERSUFL	CALCIUM	10.000000
DEERSUFL	COST	111.000000
DEERSUFL	IRON	2.600000

DEERSUFL	KCALORIES	138.430000
DEERSUFL	NIACIN	6.240000
DEERSUFL	PHOSPHORUS	246.000000
DEERSUFL	PROTEIN	20.800000
DEERSUFL	RIBOFLAVIN	0.510000
DEERSUFL	THIAMIN	0.230000
DEERSUFL	VITAMIN_A	826.000000
DUCKFARI	ASCORBIC	2.100000
DUCKFARI	AVAILABLE	0.177620
DUCKFARI	CALCIUM	10.000000
DUCKFARI	COST	4178.000000
DUCKFARI	IRON	1.600000
DUCKFARI	KCALORIES	254.260000
DUCKFARI	NIACIN	6.700000
DUCKFARI	PHOSPHORUS	176.000000
DUCKFARI	PROTEIN	20.200000
DUCKFARI	RIBOFLAVIN	0.290000
DUCKFARI	THIAMIN	0.080000
DUCKFARI	VITAMIN_A	1377.000000
FISHFARI	ASCORBIC	3.000000
FISHFARI	AVAILABLE	30.710150
FISHFARI	CALCIUM	15.000000
FISHFARI	COST	28.000000
FISHFARI	IRON	1.500000
FISHFARI	KCALORIES	153.620000
FISHFARI	NIACIN	3.000000
FISHFARI	PHOSPHORUS	200.000000
FISHFARI	PROTEIN	17.600000
FISHFARI	RIBOFLAVIN	0.120000
FISHFARI	THIAMIN	0.050000
FISHFARI	VITAMIN_A	21.000000
FISHSPRI	ASCORBIC	3.000000
FISHSPRI	AVAILABLE	30.710150
FISHSPRI	CALCIUM	15.000000
FISHSPRI	COST	89.000000
FISHSPRI	IRON	1.500000
FISHSPRI	KCALORIES	153.620000
FISHSPRI	NIACIN	3.000000
FISHSPRI	PHOSPHORUS	200.000000
FISHSPRI	PROTEIN	17.600000
FISHSPRI	RIBOFLAVIN	0.120000
FISHSPRI	THIAMIN	0.050000
FISHSPRI	VITAMIN_A	21.000000
FISHSURI	ASCORBIC	3.000000
FISHSURI	AVAILABLE	30.710150
FISHSURI	CALCIUM	15.000000
FISHSURI	COST	63.000000
FISHSURI	IRON	1.500000
FISHSURI	KCALORIES	153.620000
FISHSURI	NIACIN	3.000000
FISHSURI	PHOSPHORUS	200.000000
FISHSURI	PROTEIN	17.600000
FISHSURI	RIBOFLAVIN	0.120000
FISHSURI	THIAMIN	0.050000
FISHSURI	VITAMIN_A	21.000000
GRAPESUFL	ASCORBIC	4.000000
GRAPESUFL	AVAILABLE	0.463730
GRAPESUFL	CALCIUM	16.000000
GRAPESUFL	COST	46.000000
GRAPESUFL	IRON	0.100000
GRAPESUFL	KCALORIES	69.260000
GRAPESUFL	NIACIN	0.300000
GRAPESUFL	PHOSPHORUS	12.000000
GRAPESUFL	PROTEIN	1.300000
GRAPESUFL	RIBOFLAVIN	0.030000
GRAPESUFL	THIAMIN	0.050000
GRAPESUFL	VITAMIN_A	100.000000
HAWTHOFAFL	ASCORBIC	22.300000
HAWTHOFAFL	AVAILABLE	0.072200

HAWTHOFAFL	CALCIUM	85.000000
HAWTHOFAFL	COST	65.000000
HAWTHOFAFL	IRON	2.100000
HAWTHOFAFL	KCALORIES	92.000000
HAWTHOFAFL	NIACIN	0.430000
HAWTHOFAFL	PHOSPHORUS	25.000000
HAWTHOFAFL	PROTEIN	0.400000
HAWTHOFAFL	RIBOFLAVIN	0.050000
HAWTHOFAFL	THIAMIN	0.050000
HAWTHOFAFL	VITAMIN_A	303.000000
HAZELNFAFL	ASCORBIC	0.000000
HAZELNFAFL	AVAILABLE	0.243020
HAZELNFAFL	CALCIUM	209.000000
HAZELNFAFL	COST	1277.000000
HAZELNFAFL	IRON	3.400000
HAZELNFAFL	KCALORIES	633.980000
HAZELNFAFL	NIACIN	0.900000
HAZELNFAFL	PHOSPHORUS	337.000000
HAZELNFAFL	PROTEIN	12.600000
HAZELNFAFL	RIBOFLAVIN	0.410000
HAZELNFAFL	THIAMIN	0.460000
HAZELNFAFL	VITAMIN_A	25.000000
HICKORFAUP	ASCORBIC	0.000000
HICKORFAUP	AVAILABLE	69.030210
HICKORFAUP	CALCIUM	0.000000
HICKORFAUP	COST	247.000000
HICKORFAUP	IRON	2.400000
HICKORFAUP	KCALORIES	672.920000
HICKORFAUP	NIACIN	0.800000
HICKORFAUP	PHOSPHORUS	360.000000
HICKORFAUP	PROTEIN	13.200000
HICKORFAUP	RIBOFLAVIN	0.110000
HICKORFAUP	THIAMIN	0.340000
HICKORFAUP	VITAMIN_A	150.000000
MUSKRAFARI	ASCORBIC	1.500000
MUSKRAFARI	AVAILABLE	0.472240
MUSKRAFARI	CALCIUM	9.000000
MUSKRAFARI	COST	480.000000
MUSKRAFARI	IRON	2.200000
MUSKRAFARI	KCALORIES	117.440000
MUSKRAFARI	NIACIN	5.040000
MUSKRAFARI	PHOSPHORUS	158.000000
MUSKRAFARI	PROTEIN	19.900000
MUSKRAFARI	RIBOFLAVIN	0.200000
MUSKRAFARI	THIAMIN	0.210000
MUSKRAFARI	VITAMIN_A	826.000000
MUSKRASPRI	ASCORBIC	1.500000
MUSKRASPRI	AVAILABLE	0.472240
MUSKRASPRI	CALCIUM	9.000000
MUSKRASPRI	COST	543.000000
MUSKRASPRI	IRON	2.200000
MUSKRASPRI	KCALORIES	117.440000
MUSKRASPRI	NIACIN	5.040000
MUSKRASPRI	PHOSPHORUS	158.000000
MUSKRASPRI	PROTEIN	19.900000
MUSKRASPRI	RIBOFLAVIN	0.200000
MUSKRASPRI	THIAMIN	0.210000
MUSKRASPRI	VITAMIN_A	826.000000
MUSKRASURI	ASCORBIC	1.500000
MUSKRASURI	AVAILABLE	0.472240
MUSKRASURI	CALCIUM	9.000000
MUSKRASURI	COST	543.000000
MUSKRASURI	IRON	2.200000
MUSKRASURI	KCALORIES	117.440000
MUSKRASURI	NIACIN	5.040000
MUSKRASURI	PHOSPHORUS	158.000000
MUSKRASURI	PROTEIN	19.900000
MUSKRASURI	RIBOFLAVIN	0.200000
MUSKRASURI	THIAMIN	0.210000

MUSKRASURI	VITAMIN_A	826.000000
MUSSELFARI	ASCORBIC	0.300000
MUSSELFARI	AVAILABLE	116.984290
MUSSELFARI	CALCIUM	772.900000
MUSSELFARI	COST	40.000000
MUSSELFARI	IRON	20.160000
MUSSELFARI	KCALORIES	51.800000
MUSSELFARI	NIACIN	1.450000
MUSSELFARI	PHOSPHORUS	431.800000
MUSSELFARI	PROTEIN	7.340000
MUSSELFARI	RIBOFLAVIN	0.250000
MUSSELFARI	THIAMIN	0.000000
MUSSELFARI	VITAMIN_A	17.000000
OPOSSUFAFL	ASCORBIC	1.800000
OPOSSUFAFL	AVAILABLE	0.055730
OPOSSUFAFL	CALCIUM	9.000000
OPOSSUFAFL	COST	184.000000
OPOSSUFAFL	IRON	2.200000
OPOSSUFAFL	KCALORIES	262.380000
OPOSSUFAFL	NIACIN	35.060000
OPOSSUFAFL	PHOSPHORUS	158.000000
OPOSSUFAFL	PROTEIN	19.200000
OPOSSUFAFL	RIBOFLAVIN	0.340000
OPOSSUFAFL	THIAMIN	0.140000
OPOSSUFAFL	VITAMIN_A	1101.000000
OPOSSUSPFL	ASCORBIC	1.800000
OPOSSUSPFL	AVAILABLE	0.055730
OPOSSUSPFL	CALCIUM	11.000000
OPOSSUSPFL	COST	304.000000
OPOSSUSPFL	IRON	2.600000
OPOSSUSPFL	KCALORIES	134.290000
OPOSSUSPFL	NIACIN	6.060000
OPOSSUSPFL	PHOSPHORUS	190.000000
OPOSSUSPFL	PROTEIN	23.000000
OPOSSUSPFL	RIBOFLAVIN	0.400000
OPOSSUSPFL	THIAMIN	0.000000
OPOSSUSPFL	VITAMIN_A	1101.000000
OPOSSUSUFL	ASCORBIC	1.800000
OPOSSUSUFL	AVAILABLE	0.055730
OPOSSUSUFL	CALCIUM	10.000000
OPOSSUSUFL	COST	284.000000
OPOSSUSUFL	IRON	2.500000
OPOSSUSUFL	KCALORIES	169.710000
OPOSSUSUFL	NIACIN	5.760000
OPOSSUSUFL	PHOSPHORUS	180.000000
OPOSSUSUFL	PROTEIN	22.000000
OPOSSUSUFL	RIBOFLAVIN	0.390000
OPOSSUSUFL	THIAMIN	0.160000
OPOSSUSUFL	VITAMIN_A	1101.000000
PAWPAWFABL	ASCORBIC	10.000000
PAWPAWFABL	AVAILABLE	0.381010
PAWPAWFABL	CALCIUM	8.000000
PAWPAWFABL	COST	12.000000
PAWPAWFABL	IRON	0.700000
PAWPAWFABL	KCALORIES	85.840000
PAWPAWFABL	NIACIN	0.700000
PAWPAWFABL	PHOSPHORUS	26.000000
PAWPAWFABL	PROTEIN	5.200000
PAWPAWFABL	RIBOFLAVIN	0.060000
PAWPAWFABL	THIAMIN	0.050000
PAWPAWFABL	VITAMIN_A	190.000000
PLUMFAFL	ASCORBIC	4.000000
PLUMFAFL	AVAILABLE	1.010780
PLUMFAFL	CALCIUM	12.000000
PLUMFAFL	COST	28.000000
PLUMFAFL	IRON	0.500000
PLUMFAFL	KCALORIES	75.280000
PLUMFAFL	NIACIN	0.500000
PLUMFAFL	PHOSPHORUS	18.000000

PLUMFAFL	PROTEIN	0.800000
PLUMFAFL	RIBOFLAVIN	0.030000
PLUMFAFL	THIAMIN	0.030000
PLUMFAFL	VITAMIN_A	300.000000
RABBITFABL	ASCORBIC	1.800000
RABBITFABL	AVAILABLE	0.272940
RABBITFABL	CALCIUM	9.000000
RABBITFABL	COST	184.000000
RABBITFABL	IRON	2.200000
RABBITFABL	KCALORIES	262.380000
RABBITFABL	NIACIN	35.050000
RABBITFABL	PHOSPHORUS	158.000000
RABBITFABL	PROTEIN	19.200000
RABBITFABL	RIBOFLAVIN	0.340000
RABBITFABL	THIAMIN	0.140000
RABBITFABL	VITAMIN_A	1101.000000
RABBITFAFL	ASCORBIC	1.800000
RABBITFAFL	AVAILABLE	0.072410
RABBITFAFL	CALCIUM	9.000000
RABBITFAFL	COST	184.000000
RABBITFAFL	IRON	2.200000
RABBITFAFL	KCALORIES	262.380000
RABBITFAFL	NIACIN	35.050000
RABBITFAFL	PHOSPHORUS	158.000000
RABBITFAFL	PROTEIN	19.200000
RABBITFAFL	RIBOFLAVIN	0.340000
RABBITFAFL	THIAMIN	0.140000
RABBITFAFL	VITAMIN_A	1101.000000
RABBITFAUP	ASCORBIC	1.800000
RABBITFAUP	AVAILABLE	0.262295
RABBITFAUP	CALCIUM	9.000000
RABBITFAUP	COST	184.000000
RABBITFAUP	IRON	2.200000
RABBITFAUP	KCALORIES	262.380000
RABBITFAUP	NIACIN	35.050000
RABBITFAUP	PHOSPHORUS	158.000000
RABBITFAUP	PROTEIN	19.200000
RABBITFAUP	RIBOFLAVIN	0.340000
RABBITFAUP	THIAMIN	0.140000
RABBITFAUP	VITAMIN_A	1101.000000
RABBITSPBL	ASCORBIC	1.800000
RABBITSPBL	AVAILABLE	0.211435
RABBITSPBL	CALCIUM	11.000000
RABBITSPBL	COST	304.000000
RABBITSPBL	IRON	2.600000
RABBITSPBL	KCALORIES	134.290000
RABBITSPBL	NIACIN	6.060000
RABBITSPBL	PHOSPHORUS	190.000000
RABBITSPBL	PROTEIN	23.000000
RABBITSPBL	RIBOFLAVIN	0.400000
RABBITSPBL	THIAMIN	0.000000
RABBITSPBL	VITAMIN_A	1101.000000
RABBITSPFL	ASCORBIC	1.800000
RABBITSPFL	AVAILABLE	0.056090
RABBITSPFL	CALCIUM	11.000000
RABBITSPFL	COST	304.000000
RABBITSPFL	IRON	2.600000
RABBITSPFL	KCALORIES	134.290000
RABBITSPFL	NIACIN	6.060000
RABBITSPFL	PHOSPHORUS	190.000000
RABBITSPFL	PROTEIN	23.000000
RABBITSPFL	RIBOFLAVIN	0.400000
RABBITSPFL	THIAMIN	0.000000
RABBITSPFL	VITAMIN_A	1101.000000
RABBITSPUP	ASCORBIC	1.800000
RABBITSPUP	AVAILABLE	0.203190
RABBITSPUP	CALCIUM	11.000000
RABBITSPUP	COST	304.000000
RABBITSPUP	IRON	2.600000

RABBITSPUP	KCALORIES	134.290000
RABBITSPUP	NIACIN	6.060000
RABBITSPUP	PHOSPHORUS	190.000000
RABBITSPUP	PROTEIN	23.000000
RABBITSPUP	RIBOFLAVIN	0.400000
RABBITSPUP	THIAMIN	0.000000
RABBITSPUP	VITAMIN_A	1101.000000
RABBITSUBL	ASCORBIC	1.800000
RABBITSUBL	AVAILABLE	0.211435
RABBITSUBL	CALCIUM	10.000000
RABBITSUBL	COST	284.000000
RABBITSUBL	IRON	2.500000
RABBITSUBL	KCALORIES	169.710000
RABBITSUBL	NIACIN	5.760000
RABBITSUBL	PHOSPHORUS	180.000000
RABBITSUBL	PROTEIN	22.000000
RABBITSUBL	RIBOFLAVIN	0.390000
RABBITSUBL	THIAMIN	0.160000
RABBITSUBL	VITAMIN_A	1101.000000
RABBITSUFL	ASCORBIC	1.800000
RABBITSUFL	AVAILABLE	0.056090
RABBITSUFL	CALCIUM	10.000000
RABBITSUFL	COST	284.000000
RABBITSUFL	IRON	2.500000
RABBITSUFL	KCALORIES	169.710000
RABBITSUFL	NIACIN	5.760000
RABBITSUFL	PHOSPHORUS	180.000000
RABBITSUFL	PROTEIN	22.000000
RABBITSUFL	RIBOFLAVIN	0.390000
RABBITSUFL	THIAMIN	0.160000
RABBITSUFL	VITAMIN_A	1101.000000
RABBITSUUP	ASCORBIC	1.800000
RABBITSUUP	AVAILABLE	0.203190
RABBITSUUP	CALCIUM	10.000000
RABBITSUUP	COST	284.000000
RABBITSUUP	IRON	2.500000
RABBITSUUP	KCALORIES	169.710000
RABBITSUUP	NIACIN	5.760000
RABBITSUUP	PHOSPHORUS	180.000000
RABBITSUUP	PROTEIN	22.000000
RABBITSUUP	RIBOFLAVIN	0.390000
RABBITSUUP	THIAMIN	0.160000
RABBITSUUP	VITAMIN_A	1101.000000
RACCOOFAFL	ASCORBIC	1.500000
RACCOOFAFL	AVAILABLE	0.150005
RACCOOFAFL	CALCIUM	9.000000
RACCOOFAFL	COST	242.000000
RACCOOFAFL	IRON	2.200000
RACCOOFAFL	KCALORIES	441.370000
RACCOOFAFL	NIACIN	5.050000
RACCOOFAFL	PHOSPHORUS	158.000000
RACCOOFAFL	PROTEIN	13.800000
RACCOOFAFL	RIBOFLAVIN	0.310000
RACCOOFAFL	THIAMIN	0.500000
RACCOOFAFL	VITAMIN_A	826.000000
RACCOOSPFL	ASCORBIC	1.500000
RACCOOSPFL	AVAILABLE	0.090005
RACCOOSPFL	CALCIUM	9.000000
RACCOOSPFL	COST	430.000000
RACCOOSPFL	IRON	3.700000
RACCOOSPFL	KCALORIES	134.290000
RACCOOSPFL	NIACIN	8.430000
RACCOOSPFL	PHOSPHORUS	264.000000
RACCOOSPFL	PROTEIN	23.000000
RACCOOSPFL	RIBOFLAVIN	0.490000
RACCOOSPFL	THIAMIN	0.830000
RACCOOSPFL	VITAMIN_A	826.000000
RACCOOSUFL	ASCORBIC	1.500000
RACCOOSUFL	AVAILABLE	0.094365

RACCOOSUFL	CALCIUM	10.000000
RACCOOSUFL	COST	398.000000
RACCOOSUFL	IRON	2.500000
RACCOOSUFL	KCALORIES	373.670000
RACCOOSUFL	NIACIN	5.810000
RACCOOSUFL	PHOSPHORUS	182.000000
RACCOOSUFL	PROTEIN	15.900000
RACCOOSUFL	RIBOFLAVIN	0.350000
RACCOOSUFL	THIAMIN	0.570000
RACCOOSUFL	VITAMIN_A	826.000000
SNAPPIFARI	ASCORBIC	2.000000
SNAPPIFARI	AVAILABLE	0.017960
SNAPPIFARI	CALCIUM	107.000000
SNAPPIFARI	COST	179.000000
SNAPPIFARI	IRON	2.000000
SNAPPIFARI	KCALORIES	69.270000
SNAPPIFARI	NIACIN	7.000000
SNAPPIFARI	PHOSPHORUS	220.000000
SNAPPIFARI	PROTEIN	15.800000
SNAPPIFARI	RIBOFLAVIN	0.710000
SNAPPIFARI	THIAMIN	0.220000
SNAPPIFARI	VITAMIN_A	19.000000
SOFTSHFARI	ASCORBIC	1.700000
SOFTSHFARI	AVAILABLE	0.015925
SOFTSHFARI	CALCIUM	107.000000
SOFTSHFARI	COST	274.000000
SOFTSHFARI	IRON	1.500000
SOFTSHFARI	KCALORIES	81.940000
SOFTSHFARI	NIACIN	2.600000
SOFTSHFARI	PHOSPHORUS	146.000000
SOFTSHFARI	PROTEIN	17.500000
SOFTSHFARI	RIBOFLAVIN	0.710000
SOFTSHFARI	THIAMIN	0.250000
SOFTSHFARI	VITAMIN_A	1652.000000
SQUIRRFABL	ASCORBIC	1.100000
SQUIRRFABL	AVAILABLE	0.213215
SQUIRRFABL	CALCIUM	13.000000
SQUIRRFABL	COST	542.000000
SQUIRRFABL	IRON	1.100000
SQUIRRFABL	KCALORIES	444.170000
SQUIRRFABL	NIACIN	2.320000
SQUIRRFABL	PHOSPHORUS	116.000000
SQUIRRFABL	PROTEIN	15.300000
SQUIRRFABL	RIBOFLAVIN	0.260000
SQUIRRFABL	THIAMIN	0.040000
SQUIRRFABL	VITAMIN_A	1101.000000
SQUIRRFAFL	ASCORBIC	1.100000
SQUIRRFAFL	AVAILABLE	0.056565
SQUIRRFAFL	CALCIUM	13.000000
SQUIRRFAFL	COST	542.000000
SQUIRRFAFL	IRON	1.100000
SQUIRRFAFL	KCALORIES	444.170000
SQUIRRFAFL	NIACIN	2.320000
SQUIRRFAFL	PHOSPHORUS	116.000000
SQUIRRFAFL	PROTEIN	15.300000
SQUIRRFAFL	RIBOFLAVIN	0.260000
SQUIRRFAFL	THIAMIN	0.040000
SQUIRRFAFL	VITAMIN_A	1101.000000
SQUIRRFAUP	ASCORBIC	1.100000
SQUIRRFAUP	AVAILABLE	0.204900
SQUIRRFAUP	CALCIUM	13.000000
SQUIRRFAUP	COST	542.000000
SQUIRRFAUP	IRON	1.100000
SQUIRRFAUP	KCALORIES	444.170000
SQUIRRFAUP	NIACIN	2.320000
SQUIRRFAUP	PHOSPHORUS	116.000000
SQUIRRFAUP	PROTEIN	15.300000
SQUIRRFAUP	RIBOFLAVIN	0.260000
SQUIRRFAUP	THIAMIN	0.040000

SQUIRRFAUP	VITAMIN_A	1101.000000
SQUIRRSPBL	ASCORBIC	1.100000
SQUIRRSPBL	AVAILABLE	0.123515
SQUIRRSPBL	CALCIUM	23.000000
SQUIRRSPBL	COST	1211.000000
SQUIRRSPBL	IRON	1.900000
SQUIRRSPBL	KCALORIES	112.660000
SQUIRRSPBL	NIACIN	4.000000
SQUIRRSPBL	PHOSPHORUS	200.000000
SQUIRRSPBL	PROTEIN	26.300000
SQUIRRSPBL	RIBOFLAVIN	0.350000
SQUIRRSPBL	THIAMIN	0.070000
SQUIRRSPBL	VITAMIN_A	1101.000000
SQUIRRSPFL	ASCORBIC	1.100000
SQUIRRSPFL	AVAILABLE	0.032765
SQUIRRSPFL	CALCIUM	23.000000
SQUIRRSPFL	COST	1211.000000
SQUIRRSPFL	IRON	1.900000
SQUIRRSPFL	KCALORIES	112.660000
SQUIRRSPFL	NIACIN	4.000000
SQUIRRSPFL	PHOSPHORUS	200.000000
SQUIRRSPFL	PROTEIN	26.300000
SQUIRRSPFL	RIBOFLAVIN	0.350000
SQUIRRSPFL	THIAMIN	0.070000
SQUIRRSPFL	VITAMIN_A	1101.000000
SQUIRRSPUP	ASCORBIC	1.100000
SQUIRRSPUP	AVAILABLE	0.118700
SQUIRRSPUP	CALCIUM	23.000000
SQUIRRSPUP	COST	1211.000000
SQUIRRSPUP	IRON	1.900000
SQUIRRSPUP	KCALORIES	112.660000
SQUIRRSPUP	NIACIN	4.000000
SQUIRRSPUP	PHOSPHORUS	200.000000
SQUIRRSPUP	PROTEIN	26.300000
SQUIRRSPUP	RIBOFLAVIN	0.350000
SQUIRRSPUP	THIAMIN	0.070000
SQUIRRSPUP	VITAMIN_A	1101.000000
SQUIRRSUBL	ASCORBIC	1.100000
SQUIRRSUBL	AVAILABLE	0.168230
SQUIRRSUBL	CALCIUM	18.000000
SQUIRRSUBL	COST	1015.000000
SQUIRRSUBL	IRON	1.500000
SQUIRRSUBL	KCALORIES	278.240000
SQUIRRSUBL	NIACIN	3.160000
SQUIRRSUBL	PHOSPHORUS	158.000000
SQUIRRSUBL	PROTEIN	20.800000
SQUIRRSUBL	RIBOFLAVIN	0.380000
SQUIRRSUBL	THIAMIN	0.060000
SQUIRRSUBL	VITAMIN_A	1101.000000
SQUIRRSUFL	ASCORBIC	1.100000
SQUIRRSUFL	AVAILABLE	0.044630
SQUIRRSUFL	CALCIUM	18.000000
SQUIRRSUFL	COST	1015.000000
SQUIRRSUFL	IRON	1.500000
SQUIRRSUFL	KCALORIES	278.240000
SQUIRRSUFL	NIACIN	3.160000
SQUIRRSUFL	PHOSPHORUS	158.000000
SQUIRRSUFL	PROTEIN	20.800000
SQUIRRSUFL	RIBOFLAVIN	0.380000
SQUIRRSUFL	THIAMIN	0.060000
SQUIRRSUFL	VITAMIN_A	1101.000000
SQUIRRSUUP	ASCORBIC	1.100000
SQUIRRSUUP	AVAILABLE	0.161670
SQUIRRSUUP	CALCIUM	18.000000
SQUIRRSUUP	COST	1015.000000
SQUIRRSUUP	IRON	1.500000
SQUIRRSUUP	KCALORIES	278.240000
SQUIRRSUUP	NIACIN	3.160000
SQUIRRSUUP	PHOSPHORUS	158.000000

SQUIRRSUUP	PROTEIN	20.800000
SQUIRRSUUP	RIBOFLAVIN	0.380000
SQUIRRSUUP	THIAMIN	0.060000
SQUIRRSUUP	VITAMIN_A	1101.000000
TERRAPFARI	ASCORBIC	1.700000
TERRAPFARI	AVAILABLE	0.423050
TERRAPFARI	CALCIUM	107.000000
TERRAPFARI	COST	165.000000
TERRAPFARI	IRON	3.200000
TERRAPFARI	KCALORIES	110.990000
TERRAPFARI	NIACIN	4.800000
TERRAPFARI	PHOSPHORUS	183.000000
TERRAPFARI	PROTEIN	18.600000
TERRAPFARI	RIBOFLAVIN	0.690000
TERRAPFARI	THIAMIN	0.240000
TERRAPFARI	VITAMIN_A	1652.000000
TUBERFAFL	ASCORBIC	4.000000
TUBERFAFL	AVAILABLE	2.824660
TUBERFAFL	CALCIUM	14.000000
TUBERFAFL	COST	60.000000
TUBERFAFL	IRON	3.400000
TUBERFAFL	KCALORIES	69.900000
TUBERFAFL	NIACIN	1.300000
TUBERFAFL	PHOSPHORUS	78.000000
TUBERFAFL	PROTEIN	2.300000
TUBERFAFL	RIBOFLAVIN	0.060000
TUBERFAFL	THIAMIN	0.200000
TUBERFAFL	VITAMIN_A	20.000000
TUBERSPFL	ASCORBIC	4.000000
TUBERSPFL	AVAILABLE	2.720080
TUBERSPFL	CALCIUM	14.000000
TUBERSPFL	COST	85.000000
TUBERSPFL	IRON	3.400000
TUBERSPFL	KCALORIES	69.900000
TUBERSPFL	NIACIN	1.300000
TUBERSPFL	PHOSPHORUS	78.000000
TUBERSPFL	PROTEIN	2.300000
TUBERSPFL	RIBOFLAVIN	0.060000
TUBERSPFL	THIAMIN	0.200000
TUBERSPFL	VITAMIN_A	20.000000
TUBERSUFL	ASCORBIC	4.000000
TUBERSUFL	AVAILABLE	0.523150
TUBERSUFL	CALCIUM	14.000000
TUBERSUFL	COST	85.000000
TUBERSUFL	IRON	3.400000
TUBERSUFL	KCALORIES	69.900000
TUBERSUFL	NIACIN	1.300000
TUBERSUFL	PHOSPHORUS	78.000000
TUBERSUFL	PROTEIN	2.300000
TUBERSUFL	RIBOFLAVIN	0.060000
TUBERSUFL	THIAMIN	0.200000
TUBERSUFL	VITAMIN_A	20.000000
TURKEYFAFL	ASCORBIC	1.800000
TURKEYFAFL	AVAILABLE	0.116845
TURKEYFAFL	CALCIUM	6.000000
TURKEYFAFL	COST	146.000000
TURKEYFAFL	IRON	1.200000
TURKEYFAFL	KCALORIES	342.850000
TURKEYFAFL	NIACIN	6.120000
TURKEYFAFL	PHOSPHORUS	162.000000
TURKEYFAFL	PROTEIN	18.400000
TURKEYFAFL	RIBOFLAVIN	0.130000
TURKEYFAFL	THIAMIN	0.060000
TURKEYFAFL	VITAMIN_A	531.000000
TURKEYFAUP	ASCORBIC	1.800000
TURKEYFAUP	AVAILABLE	0.423270
TURKEYFAUP	CALCIUM	6.000000
TURKEYFAUP	COST	146.000000
TURKEYFAUP	IRON	1.200000

.	TURKEYFAUP	KCALORIES 342.850000
.	TURKEYFAUP	NIACIN 6.120000
.	TURKEYFAUP	PHOSPHORUS 162.000000
.	TURKEYFAUP	PROTEIN 18.400000
.	TURKEYFAUP	RIBOFLAVIN 0.130000
.	TURKEYFAUP	THIAMIN 0.060000
.	TURKEYFAUP	VITAMIN_A 531.000000
.	TURKEYSPFL	ASCORBIC 1.800000
.	TURKEYSPFL	AVAILABLE 0.093810
.	TURKEYSPFL	CALCIUM 8.000000
.	TURKEYSPFL	COST 283.000000
.	TURKEYSPFL	IRON 1.400000
.	TURKEYSPFL	KCALORIES 226.490000
.	TURKEYSPFL	NIACIN 7.420000
.	TURKEYSPFL	PHOSPHORUS 197.000000
.	TURKEYSPFL	PROTEIN 22.200000
.	TURKEYSPFL	RIBOFLAVIN 0.160000
.	TURKEYSPFL	THIAMIN 0.080000
.	TURKEYSPFL	VITAMIN_A 531.000000
.	TURKEYSPUP	ASCORBIC 1.800000
.	TURKEYSPUP	AVAILABLE 0.339830
.	TURKEYSPUP	CALCIUM 8.000000
.	TURKEYSPUP	COST 283.000000
.	TURKEYSPUP	IRON 1.400000
.	TURKEYSPUP	KCALORIES 226.490000
.	TURKEYSPUP	NIACIN 7.420000
.	TURKEYSPUP	PHOSPHORUS 197.000000
.	TURKEYSPUP	PROTEIN 22.200000
.	TURKEYSPUP	RIBOFLAVIN 0.160000
.	TURKEYSPUP	THIAMIN 0.080000
.	TURKEYSPUP	VITAMIN_A 531.000000
.	TURKEYSUFL	ASCORBIC 1.800000
.	TURKEYSUFL	AVAILABLE 0.070680
.	TURKEYSUFL	CALCIUM 8.000000
.	TURKEYSUFL	COST 305.000000
.	TURKEYSUFL	IRON 1.500000
.	TURKEYSUFL	KCALORIES 158.310000
.	TURKEYSUFL	NIACIN 8.160000
.	TURKEYSUFL	PHOSPHORUS 216.000000
.	TURKEYSUFL	PROTEIN 24.400000
.	TURKEYSUFL	RIBOFLAVIN 0.170000
.	TURKEYSUFL	THIAMIN 0.080000
.	TURKEYSUFL	VITAMIN_A 531.000000
.	TURKEYSUUP	ASCORBIC 1.800000
.	TURKEYSUUP	AVAILABLE 0.256045
.	TURKEYSUUP	CALCIUM 8.000000
.	TURKEYSUUP	COST 305.000000
.	TURKEYSUUP	IRON 1.500000
.	TURKEYSUUP	KCALORIES 158.310000
.	TURKEYSUUP	NIACIN 8.160000
.	TURKEYSUUP	PHOSPHORUS 216.000000
.	TURKEYSUUP	PROTEIN 24.400000
.	TURKEYSUUP	RIBOFLAVIN 0.170000
.	TURKEYSUUP	THIAMIN 0.080000
.	TURKEYSUUP	VITAMIN_A 531.000000
.	WALNUTFAFL	ASCORBIC 2.000000
.	WALNUTFAFL	AVAILABLE 137.465940
.	WALNUTFAFL	CALCIUM 0.000000
.	WALNUTFAFL	COST 887.000000
.	WALNUTFAFL	IRON 6.000000
.	WALNUTFAFL	KCALORIES 627.720000
.	WALNUTFAFL	NIACIN 0.700000
.	WALNUTFAFL	PHOSPHORUS 570.000000
.	WALNUTFAFL	PROTEIN 20.500000
.	WALNUTFAFL	RIBOFLAVIN 0.110000
.	WALNUTFAFL	THIAMIN 0.220000
.	WALNUTFAFL	VITAMIN_A 300.000000
.	_RHS_	COST 0
.	_RHS_	KCALORIES 1386

```
.       _RHS_       PROTEIN                 26.46
.       _RHS_       CALCIUM                541.8
.       _RHS_       PHOSPHORUS             541.8
.       _RHS_       IRON                     8.19
.       _RHS_       VITAMIN_A             1827
.       _RHS_       THIAMIN                  .567
.       _RHS_       RIBOFLAVIN               .630
.       _RHS_       NIACIN                  7.56
.       _RHS_       ASCORBIC                18.9
PROC LP SPARSEDATA RANGEPRICE;
RUN;
/*
```

```
//R137FSPR JOB (,,5,1),PRENTICE,CLASS=2,
//       USER=POTTERY,PASSWORD=
/*ROUTE PRINT NER.R0
// EXEC SAS
DATA;
  INPUT _TYPE_ $ @10 _COL_ $13. @24 _ROW_ $16. _COEF_;
  CARDS;
MIN     .              COST                .
GE      .              KCALORIES           .
GE      .              PROTEIN             .
GE      .              CALCIUM             .
GE      .              PHOSPHORUS          .
GE      .              IRON                .
GE      .              VITAMIN_A           .
GE      .              THIAMIN             .
GE      .              RIBOFLAVIN          .
GE      .              NIACIN              .
GE      .              ASCORBIC            .
UPPERBD .              AVAILABLE           .
.       AMARANSPFL     ASCORBIC          98.700000
.       AMARANSPFL     AVAILABLE          3.784210
.       AMARANSPFL     CALCIUM          210.000000
.       AMARANSPFL     COST              44.000000
.       AMARANSPFL     IRON               2.300000
.       AMARANSPFL     KCALORIES         33.870000
.       AMARANSPFL     NIACIN             1.270000
.       AMARANSPFL     PHOSPHORUS        52.000000
.       AMARANSPFL     PROTEIN            3.400000
.       AMARANSPFL     RIBOFLAVIN         0.310000
.       AMARANSPFL     THIAMIN            0.110000
.       AMARANSPFL     VITAMIN_A .     8800.000000
.       BEARFABL     ASCORBIC             1.300000
.       BEARFABL     AVAILABLE            0.166295
.       BEARFABL     CALCIUM              9.000000
.       BEARFABL     COST               363.000000
.       BEARFABL     IRON                 2.200000
.       BEARFABL     KCALORIES          334.170000
.       BEARFABL     NIACIN               5.050000
.       BEARFABL     PHOSPHORUS         158.000000
.       BEARFABL     PROTEIN             17.000000
.       BEARFABL     RIBOFLAVIN           0.340000
.       BEARFABL     THIAMIN              0.620000
.       BEARFABL     VITAMIN_A          551.000000
.       BEARFAFL     ASCORBIC             1.300000
.       BEARFAFL     AVAILABLE            0.044115
.       BEARFAFL     CALCIUM              9.000000
.       BEARFAFL     COST               363.000000
.       BEARFAFL     IRON                 2.200000
.       BEARFAFL     KCALORIES          334.170000
.       BEARFAFL     NIACIN               5.050000
.       BEARFAFL     PHOSPHORUS         158.000000
.       BEARFAFL     PROTEIN             17.000000
.       BEARFAFL     RIBOFLAVIN           0.340000
.       BEARFAFL     THIAMIN              0.620000
.       BEARFAFL     VITAMIN_A          551.000000
.       BEARFAUP     ASCORBIC             1.300000
.       BEARFAUP     AVAILABLE            0.159810
.       BEARFAUP     CALCIUM              9.000000
.       BEARFAUP     COST               363.000000
.       BEARFAUP     IRON                 2.200000
.       BEARFAUP     KCALORIES          334.170000
.       BEARFAUP     NIACIN               5.060000
.       BEARFAUP     PHOSPHORUS         158.000000
.       BEARFAUP     PROTEIN             17.000000
.       BEARFAUP     RIBOFLAVIN           0.340000
.       BEARFAUP     THIAMIN              0.620000
.       BEARFAUP     VITAMIN_A          551.000000
.       BEARSPBL     ASCORBIC             1.300000
.       BEARSPBL     AVAILABLE            0.124290
```

.	BEARSPBL	CALCIUM	12.000000
.	BEARSPBL	COST	440.000000
.	BEARSPBL	IRON	3.000000
.	BEARSPBL	KCALORIES	134.290000
.	BEARSPBL	NIACIN	6.820000
.	BEARSPBL	PHOSPHORUS	213.000000
.	BEARSPBL	PROTEIN	23.000000
.	BEARSPBL	RIBOFLAVIN	0.470000
.	BEARSPBL	THIAMIN	0.850000
.	BEARSPBL	VITAMIN_A	551.000000
.	BEARSPFL	ASCORBIC	1.300000
.	BEARSPFL	AVAILABLE	0.032975
.	BEARSPFL	CALCIUM	12.000000
.	BEARSPFL	COST	440.000000
.	BEARSPFL	IRON	3.000000
.	BEARSPFL	KCALORIES	134.290000
.	BEARSPFL	NIACIN	6.820000
.	BEARSPFL	PHOSPHORUS	213.000000
.	BEARSPFL	PROTEIN	23.000000
.	BEARSPFL	RIBOFLAVIN	0.470000
.	BEARSPFL	THIAMIN	0.850000
.	BEARSPFL	VITAMIN_A	551.000000
.	BEARSPUP	ASCORBIC	1.300000
.	BEARSPUP	AVAILABLE	0.119445
.	BEARSPUP	CALCIUM	12.000000
.	BEARSPUP	COST	440.000000
.	BEARSPUP	IRON	3.000000
.	BEARSPUP	KCALORIES	134.290000
.	BEARSPUP	NIACIN	6.820000
.	BEARSPUP	PHOSPHORUS	213.000000
.	BEARSPUP	PROTEIN	23.000000
.	BEARSPUP	RIBOFLAVIN	0.470000
.	BEARSPUP	THIAMIN	0.850000
.	BEARSPUP	VITAMIN_A	551.000000
.	BEARWIBL	ASCORBIC	1.300000
.	BEARWIBL	AVAILABLE	0.145300
.	BEARWIBL	CALCIUM	10.000000
.	BEARWIBL	COST	239.000000
.	BEARWIBL	IRON	2.400000
.	BEARWIBL	KCALORIES	254.200000
.	BEARWIBL	NIACIN	5.560000
.	BEARWIBL	PHOSPHORUS	174.000000
.	BEARWIBL	PROTEIN	19.400000
.	BEARWIBL	RIBOFLAVIN	0.390000
.	BEARWIBL	THIAMIN	0.720000
.	BEARWIBL	VITAMIN_A	551.000000
.	BEARWIFL	ASCORBIC	1.300000
.	BEARWIFL	AVAILABLE	0.038545
.	BEARWIFL	CALCIUM	10.000000
.	BEARWIFL	COST	239.000000
.	BEARWIFL	IRON	2.400000
.	BEARWIFL	KCALORIES	254.200000
.	BEARWIFL	NIACIN	5.560000
.	BEARWIFL	PHOSPHORUS	174.000000
.	BEARWIFL	PROTEIN	19.400000
.	BEARWIFL	RIBOFLAVIN	0.390000
.	BEARWIFL	THIAMIN	0.720000
.	BEARWIFL	VITAMIN_A	551.000000
.	BEARWIUP	ASCORBIC	1.300000
.	BEARWIUP	AVAILABLE	0.139635
.	BEARWIUP	CALCIUM	10.000000
.	BEARWIUP	COST	239.000000
.	BEARWIUP	IRON	2.400000
.	BEARWIUP	KCALORIES	254.200000
.	BEARWIUP	NIACIN	5.560000
.	BEARWIUP	PHOSPHORUS	174.000000
.	BEARWIUP	PROTEIN	19.400000
.	BEARWIUP	RIBOFLAVIN	0.390000
.	BEARWIUP	THIAMIN	0.720000

.	BEARWIUP	VITAMIN_A	551.000000
.	BEAVERFARI	ASCORBIC	1.800000
.	BEAVERFARI	AVAILABLE	0.008570
.	BEAVERFARI	CALCIUM	9.000000
.	BEAVERFARI	COST	205.000000
.	BEAVERFARI	IRON	2.200000
.	BEAVERFARI	KCALORIES	200.100000
.	BEAVERFARI	NIACIN	5.050000
.	BEAVERFARI	PHOSPHORUS	158.000000
.	BEAVERFARI	PROTEIN	21.300000
.	BEAVERFARI	RIBOFLAVIN	0.390000
.	BEAVERFARI	THIAMIN	0.100000
.	BEAVERFARI	VITAMIN_A	1101.000000
.	BEAVERSPRI	ASCORBIC	1.800000
.	BEAVERSPRI	AVAILABLE	0.008570
.	BEAVERSPRI	CALCIUM	9.000000
.	BEAVERSPRI	COST	170.000000
.	BEAVERSPRI	IRON	2.200000
.	BEAVERSPRI	KCALORIES	200.100000
.	BEAVERSPRI	NIACIN	5.050000
.	BEAVERSPRI	PHOSPHORUS	158.000000
.	BEAVERSPRI	PROTEIN	21.300000
.	BEAVERSPRI	RIBOFLAVIN	0.390000
.	BEAVERSPRI	THIAMIN	0.100000
.	BEAVERSPRI	VITAMIN_A	1101.000000
.	BEAVERWIRI	ASCORBIC	1.800000
.	BEAVERWIRI	AVAILABLE	0.008570
.	BEAVERWIRI	CALCIUM	9.000000
.	BEAVERWIRI	COST	205.000000
.	BEAVERWIRI	IRON	2.200000
.	BEAVERWIRI	KCALORIES	200.100000
.	BEAVERWIRI	NIACIN	5.050000
.	BEAVERWIRI	PHOSPHORUS	158.000000
.	BEAVERWIRI	PROTEIN	21.300000
.	BEAVERWIRI	RIBOFLAVIN	0.390000
.	BEAVERWIRI	THIAMIN	0.100000
.	BEAVERWIRI	VITAMIN_A	1101.000000
.	BOXTURSPBL	ASCORBIC	1.700000
.	BOXTURSPBL	AVAILABLE	0.448140
.	BOXTURSPBL	CALCIUM	107.000000
.	BOXTURSPBL	COST	600.000000
.	BOXTURSPBL	IRON	3.200000
.	BOXTURSPBL	KCALORIES	110.990000
.	BOXTURSPBL	NIACIN	4.800000
.	BOXTURSPBL	PHOSPHORUS	183.000000
.	BOXTURSPBL	PROTEIN	18.200000
.	BOXTURSPBL	RIBOFLAVIN	0.690000
.	BOXTURSPBL	THIAMIN	0.240000
.	BOXTURSPBL	VITAMIN_A	1662.000000
.	BOXTURSPFL	ASCORBIC	1.700000
.	BOXTURSPFL	AVAILABLE	0.118887
.	BOXTURSPFL	CALCIUM	107.000000
.	BOXTURSPFL	COST	600.000000
.	BOXTURSPFL	IRON	3.200000
.	BOXTURSPFL	KCALORIES	110.990000
.	BOXTURSPFL	NIACIN	4.800000
.	BOXTURSPFL	PHOSPHORUS	183.000000
.	BOXTURSPFL	PROTEIN	18.200000
.	BOXTURSPFL	RIBOFLAVIN	0.690000
.	BOXTURSPFL	THIAMIN	0.240000
.	BOXTURSPFL	VITAMIN_A	1652.000000
.	BOXTURSPUP	ASCORBIC	1.700000
.	BOXTURSPUP	AVAILABLE	0.430667
.	BOXTURSPUP	CALCIUM	107.000000
.	BOXTURSPUP	COST	600.000000
.	BOXTURSPUP	IRON	3.200000
.	BOXTURSPUP	KCALORIES	110.990000
.	BOXTURSPUP	NIACIN	4.800000
.	BOXTURSPUP	PHOSPHORUS	183.000000

BOXTURSPUP	PROTEIN	18.200000
BOXTURSPUP	RIBOFLAVIN	0.690000
BOXTURSPUP	THIAMIN	0.240000
BOXTURSPUP	VITAMIN_A	1652.000000
C_PODGSPFL	ASCORBIC	98.700000
C_PODGSPFL	AVAILABLE	0.787830
C_PODGSPFL	CALCIUM	210.000000
C_PODGSPFL	COST	44.000000
C_PODGSPFL	IRON	2.300000
C_PODGSPFL	KCALORIES	33.870000
C_PODGSPFL	NIACIN	1.270000
C_PODGSPFL	PHOSPHORUS	52.000000
C_PODGSPFL	PROTEIN	3.400000
C_PODGSPFL	RIBOFLAVIN	0.310000
C_PODGSPFL	THIAMIN	0.110000
C_PODGSPFL	VITAMIN_A	8800.000000
C_PODSFAFL	ASCORBIC	0.000000
C_PODSFAFL	AVAILABLE	577.790160
C_PODSFAFL	CALCIUM	128.000000
C_PODSFAFL	COST	163.000000
C_PODSFAFL	IRON	12.800000
C_PODSFAFL	KCALORIES	362.690000
C_PODSFAFL	NIACIN	1.470000
C_PODSFAFL	PHOSPHORUS	442.000000
C_PODSFAFL	PROTEIN	12.600000
C_PODSFAFL	RIBOFLAVIN	6.430000
C_PODSFAFL	THIAMIN	0.650000
C_PODSFAFL	VITAMIN_A	20.000000
DEERFAUP	ASCORBIC	1.500000
DEERFAUP	AVAILABLE	1.767090
DEERFAUP	CALCIUM	8.000000
DEERFAUP	COST	118.000000
DEERFAUP	IRON	2.200000
DEERFAUP	KCALORIES	255.550000
DEERFAUP	NIACIN	5.290000
DEERFAUP	PHOSPHORUS	209.000000
DEERFAUP	PROTEIN	17.600000
DEERFAUP	RIBOFLAVIN	0.430000
DEERFAUP	THIAMIN	0.200000
DEERFAUP	VITAMIN_A	826.000000
DEERSPFL	ASCORBIC	0.000000
DEERSPFL	AVAILABLE	0.406635
DEERSPFL	CALCIUM	10.000000
DEERSPFL	COST	97.000000
DEERSPFL	IRON	2.600000
DEERSPFL	KCALORIES	125.750000
DEERSPFL	NIACIN	6.300000
DEERSPFL	PHOSPHORUS	249.000000
DEERSPFL	PROTEIN	21.000000
DEERSPFL	RIBOFLAVIN	0.510000
DEERSPFL	THIAMIN	0.230000
DEERSPFL	VITAMIN_A	826.000000
DEERWIUP	ASCORBIC	1.500000
DEERWIUP	AVAILABLE	1.624435
DEERWIUP	CALCIUM	9.000000
DEERWIUP	COST	160.000000
DEERWIUP	IRON	2.400000
DEERWIUP	KCALORIES	198.340000
DEERWIUP	NIACIN	5.730000
DEERWIUP	PHOSPHORUS	227.000000
DEERWIUP	PROTEIN	19.200000
DEERWIUP	RIBOFLAVIN	0.470000
DEERWIUP	THIAMIN	0.210000
DEERWIUP	VITAMIN_A	826.000000
DUCKSPRI	ASCORBIC	2.100000
DUCKSPRI	AVAILABLE	0.177620
DUCKSPRI	CALCIUM	10.000000
DUCKSPRI	COST	4178.000000
DUCKSPRI	IRON	1.600000

.	DUCKSPRI	KCALORIES	254.260000
.	DUCKSPRI	NIACIN	6.700000
.	DUCKSPRI	PHOSPHORUS	176.000000
.	DUCKSPRI	PROTEIN	20.200000
.	DUCKSPRI	RIBOFLAVIN	0.290000
.	DUCKSPRI	THIAMIN	0.080000
.	DUCKSPRI	VITAMIN_A	1377.000000
.	FISHFARI	ASCORBIC	3.000000
.	FISHFARI	AVAILABLE	30.710150
.	FISHFARI	CALCIUM	15.000000
.	FISHFARI	COST	63.000000
.	FISHFARI	IRON	1.500000
.	FISHFARI	KCALORIES	153.620000
.	FISHFARI	NIACIN	3.000000
.	FISHFARI	PHOSPHORUS	200.000000
.	FISHFARI	PROTEIN	17.600000
.	FISHFARI	RIBOFLAVIN	0.120000
.	FISHFARI	THIAMIN	0.050000
.	FISHFARI	VITAMIN_A	21.000000
.	FISHSPRI	ASCORBIC	3.000000
.	FISHSPRI	AVAILABLE	30.710150
.	FISHSPRI	CALCIUM	15.000000
.	FISHSPRI	COST	56.000000
.	FISHSPRI	IRON	1.500000
.	FISHSPRI	KCALORIES	153.620000
.	FISHSPRI	NIACIN	3.000000
.	FISHSPRI	PHOSPHORUS	200.000000
.	FISHSPRI	PROTEIN	17.600000
.	FISHSPRI	RIBOFLAVIN	0.120000
.	FISHSPRI	THIAMIN	0.050000
.	FISHSPRI	VITAMIN_A	21.000000
.	GREENSSPFL	ASCORBIC	94.000000
.	GREENSSPFL	AVAILABLE	1.033880
.	GREENSSPFL	CALCIUM	74.000000
.	GREENSSPFL	COST	100.000000
.	GREENSSPFL	IRON	1.400000
.	GREENSSPFL	KCALORIES	29.860000
.	GREENSSPFL	NIACIN	0.750000
.	GREENSSPFL	PHOSPHORUS	58.000000
.	GREENSSPFL	PROTEIN	2.400000
.	GREENSSPFL	RIBOFLAVIN	0.240000
.	GREENSSPFL	THIAMIN	0.080000
.	GREENSSPFL	VITAMIN_A	11100.000000
.	HAWTHOFAFL	ASCORBIC	22.300000
.	HAWTHOFAFL	AVAILABLE	0.072200
.	HAWTHOFAFL	CALCIUM	85.000000
.	HAWTHOFAFL	COST	81.000000
.	HAWTHOFAFL	IRON	2.100000
.	HAWTHOFAFL	KCALORIES	92.000000
.	HAWTHOFAFL	NIACIN	0.430000
.	HAWTHOFAFL	PHOSPHORUS	25.000000
.	HAWTHOFAFL	PROTEIN	0.400000
.	HAWTHOFAFL	RIBOFLAVIN	0.050000
.	HAWTHOFAFL	THIAMIN	0.050000
.	HAWTHOFAFL	VITAMIN_A	303.000000
.	HAZELNFAFL	ASCORBIC	0.000000
.	HAZELNFAFL	AVAILABLE	0.243020
.	HAZELNFAFL	CALCIUM	209.000000
.	HAZELNFAFL	COST	1287.000000
.	HAZELNFAFL	IRON	3.400000
.	HAZELNFAFL	KCALORIES	633.980000
.	HAZELNFAFL	NIACIN	0.900000
.	HAZELNFAFL	PHOSPHORUS	337.000000
.	HAZELNFAFL	PROTEIN	12.600000
.	HAZELNFAFL	RIBOFLAVIN	0.410000
.	HAZELNFAFL	THIAMIN	0.460000
.	HAZELNFAFL	VITAMIN_A	25.000000
.	HICKORFAUP	ASCORBIC	0.000000
.	HICKORFAUP	AVAILABLE	69.030210

HICKORFAUP	CALCIUM	0.000000
HICKORFAUP	COST	277.000000
HICKORFAUP	IRON	2.400000
HICKORFAUP	KCALORIES	672.920000
HICKORFAUP	NIACIN	0.800000
HICKORFAUP	PHOSPHORUS	360.000000
HICKORFAUP	PROTEIN	13.200000
HICKORFAUP	RIBOFLAVIN	0.110000
HICKORFAUP	THIAMIN	0.340000
HICKORFAUP	VITAMIN_A	150.000000
MUSHROSPUP	ASCORBIC	3.500000
MUSHROSPUP	AVAILABLE	2.615380
MUSHROSPUP	CALCIUM	5.000000
MUSHROSPUP	COST	110.000000
MUSHROSPUP	IRON	1.240000
MUSHROSPUP	KCALORIES	25.000000
MUSHROSPUP	NIACIN	4.120000
MUSHROSPUP	PHOSPHORUS	104.000000
MUSHROSPUP	PROTEIN	2.090000
MUSHROSPUP	RIBOFLAVIN	0.450000
MUSHROSPUP	THIAMIN	0.100000
MUSHROSPUP	VITAMIN_A	0.000000
MUSKRAFARI	ASCORBIC	1.500000
MUSKRAFARI	AVAILABLE	0.472240
MUSKRAFARI	CALCIUM	9.000000
MUSKRAFARI	COST	543.000000
MUSKRAFARI	IRON	2.200000
MUSKRAFARI	KCALORIES	117.440000
MUSKRAFARI	NIACIN	5.040000
MUSKRAFARI	PHOSPHORUS	158.000000
MUSKRAFARI	PROTEIN	19.900000
MUSKRAFARI	RIBOFLAVIN	0.200000
MUSKRAFARI	THIAMIN	0.210000
MUSKRAFARI	VITAMIN_A	826.000000
MUSKRASPRI	ASCORBIC	1.500000
MUSKRASPRI	AVAILABLE	0.472240
MUSKRASPRI	CALCIUM	9.000000
MUSKRASPRI	COST	480.000000
MUSKRASPRI	IRON	2.200000
MUSKRASPRI	KCALORIES	117.440000
MUSKRASPRI	NIACIN	5.040000
MUSKRASPRI	PHOSPHORUS	158.000000
MUSKRASPRI	PROTEIN	19.900000
MUSKRASPRI	RIBOFLAVIN	0.200000
MUSKRASPRI	THIAMIN	0.210000
MUSKRASPRI	VITAMIN_A	826.000000
MUSKRAWIRI	ASCORBIC	1.500000
MUSKRAWIRI	AVAILABLE	0.472240
MUSKRAWIRI	CALCIUM	9.000000
MUSKRAWIRI	COST	543.000000
MUSKRAWIRI	IRON	2.200000
MUSKRAWIRI	KCALORIES	117.440000
MUSKRAWIRI	NIACIN	5.040000
MUSKRAWIRI	PHOSPHORUS	158.000000
MUSKRAWIRI	PROTEIN	19.900000
MUSKRAWIRI	RIBOFLAVIN	0.200000
MUSKRAWIRI	THIAMIN	0.210000
MUSKRAWIRI	VITAMIN_A	826.000000
OPOSSUFAFL	ASCORBIC	1.800000
OPOSSUFAFL	AVAILABLE	0.055730
OPOSSUFAFL	CALCIUM	9.000000
OPOSSUFAFL	COST	219.000000
OPOSSUFAFL	IRON	2.200000
OPOSSUFAFL	KCALORIES	262.380000
OPOSSUFAFL	NIACIN	35.050000
OPOSSUFAFL	PHOSPHORUS	158.000000
OPOSSUFAFL	PROTEIN	19.200000
OPOSSUFAFL	RIBOFLAVIN	0.340000
OPOSSUFAFL	THIAMIN	0.140000

OPOSSUFAFL	VITAMIN_A	1101.000000
OPOSSUSPFL	ASCORBIC	1.800000
OPOSSUSPFL	AVAILABLE	0.055730
OPOSSUSPFL	CALCIUM	11.000000
OPOSSUSPFL	COST	269.000000
OPOSSUSPFL	IRON	2.600000
OPOSSUSPFL	KCALORIES	134.290000
OPOSSUSPFL	NIACIN	6.060000
OPOSSUSPFL	PHOSPHORUS	190.000000
OPOSSUSPFL	PROTEIN	23.000000
OPOSSUSPFL	RIBOFLAVIN	0.400000
OPOSSUSPFL	THIAMIN	0.000000
OPOSSUSPFL	VITAMIN_A	1101.000000
OPOSSUWIFL	ASCORBIC	1.800000
OPOSSUWIFL	AVAILABLE	0.055730
OPOSSUWIFL	CALCIUM	10.000000
OPOSSUWIFL	COST	289.000000
OPOSSUWIFL	IRON	2.400000
OPOSSUWIFL	KCALORIES	204.700000
OPOSSUWIFL	NIACIN	5.500000
OPOSSUWIFL	PHOSPHORUS	172.000000
OPOSSUWIFL	PROTEIN	20.900000
OPOSSUWIFL	RIBOFLAVIN	0.370000
OPOSSUWIFL	THIAMIN	0.150000
OPOSSUWIFL	VITAMIN_A	1101.000000
PLUMFAFL	ASCORBIC	4.000000
PLUMFAFL	AVAILABLE	1.010780
PLUMFAFL	CALCIUM	12.000000
PLUMFAFL	COST	46.000000
PLUMFAFL	IRON	0.500000
PLUMFAFL	KCALORIES	75.280000
PLUMFAFL	NIACIN	0.500000
PLUMFAFL	PHOSPHORUS	18.000000
PLUMFAFL	PROTEIN	0.800000
PLUMFAFL	RIBOFLAVIN	0.030000
PLUMFAFL	THIAMIN	0.030000
PLUMFAFL	VITAMIN_A	300.000000
POKEGRSPBL	ASCORBIC	98.700000
POKEGRSPBL	AVAILABLE	0.974300
POKEGRSPBL	CALCIUM	210.000000
POKEGRSPBL	COST	44.000000
POKEGRSPBL	IRON	2.300000
POKEGRSPBL	KCALORIES	33.870000
POKEGRSPBL	NIACIN	1.270000
POKEGRSPBL	PHOSPHORUS	52.000000
POKEGRSPBL	PROTEIN	3.400000
POKEGRSPBL	RIBOFLAVIN	0.310000
POKEGRSPBL	THIAMIN	0.110000
POKEGRSPBL	VITAMIN_A	8800.000000
RABBITFABL	ASCORBIC	1.800000
RABBITFABL	AVAILABLE	0.272940
RABBITFABL	CALCIUM	9.000000
RABBITFABL	COST	219.000000
RABBITFABL	IRON	2.200000
RABBITFABL	KCALORIES	262.380000
RABBITFABL	NIACIN	35.050000
RABBITFABL	PHOSPHORUS	158.000000
RABBITFABL	PROTEIN	19.200000
RABBITFABL	RIBOFLAVIN	0.340000
RABBITFABL	THIAMIN	0.140000
RABBITFABL	VITAMIN_A	1101.000000
RABBITFAFL	ASCORBIC	1.800000
RABBITFAFL	AVAILABLE	0.072410
RABBITFAFL	CALCIUM	9.000000
RABBITFAFL	COST	219.000000
RABBITFAFL	IRON	2.200000
RABBITFAFL	KCALORIES	262.380000
RABBITFAFL	NIACIN	35.050000
RABBITFAFL	PHOSPHORUS	158.000000

.	RABBITFAFL	PROTEIN	19.200000
.	RABBITFAFL	RIBOFLAVIN	0.340000
.	RABBITFAFL	THIAMIN	0.140000
.	RABBITFAFL	VITAMIN_A	1101.000000
	RABBITFAUP	ASCORBIC	1.800000
.	RABBITFAUP	AVAILABLE	0.262295
.	RABBITFAUP	CALCIUM	9.000000
.	RABBITFAUP	COST	219.000000
.	RABBITFAUP	IRON	2.200000
.	RABBITFAUP	KCALORIES	262.380000
.	RABBITFAUP	NIACIN	35.050000
.	RABBITFAUP	PHOSPHORUS	158.000000
.	RABBITFAUP	PROTEIN	19.200000
.	RABBITFAUP	RIBOFLAVIN	0.340000
.	RABBITFAUP	THIAMIN	0.140000
.	RABBITFAUP	VITAMIN_A	1101.000000
.	RABBITSPBL	ASCORBIC	1.800000
.	RABBITSPBL	AVAILABLE	0.211435
.	RABBITSPBL	CALCIUM	11.000000
.	RABBITSPBL	COST	269.000000
.	RABBITSPBL	IRON	2.600000
.	RABBITSPBL	KCALORIES	134.290000
.	RABBITSPBL	NIACIN	6.060000
.	RABBITSPBL	PHOSPHORUS	190.000000
.	RABBITSPBL	PROTEIN	23.000000
.	RABBITSPBL	RIBOFLAVIN	0.400000
.	RABBITSPBL	THIAMIN	0.000000
.	RABBITSPBL	VITAMIN_A	1101.000000
.	RABBITSPFL	ASCORBIC	1.800000
.	RABBITSPFL	AVAILABLE	0.056090
.	RABBITSPFL	CALCIUM	11.000000
.	RABBITSPFL	COST	269.000000
.	RABBITSPFL	IRON	2.600000
.	RABBITSPFL	KCALORIES	134.290000
.	RABBITSPFL	NIACIN	6.060000
.	RABBITSPFL	PHOSPHORUS	190.000000
.	RABBITSPFL	PROTEIN	23.000000
.	RABBITSPFL	RIBOFLAVIN	0.400000
.	RABBITSPFL	THIAMIN	0.000000
.	RABBITSPFL	VITAMIN_A	1101.000000
.	RABBITSPUP	ASCORBIC	1.800000
.	RABBITSPUP	AVAILABLE	0.203190
.	RABBITSPUP	CALCIUM	11.000000
.	RABBITSPUP	COST	269.000000
.	RABBITSPUP	IRON	2.600000
.	RABBITSPUP	KCALORIES	134.290000
.	RABBITSPUP	NIACIN	6.060000
.	RABBITSPUP	PHOSPHORUS	190.000000
.	RABBITSPUP	PROTEIN	23.000000
.	RABBITSPUP	RIBOFLAVIN	0.400000
.	RABBITSPUP	THIAMIN	0.000000
.	RABBITSPUP	VITAMIN_A	1101.000000
.	RABBITWIBL	ASCORBIC	1.800000
.	RABBITWIBL	AVAILABLE	0.272940
.	RABBITWIBL	CALCIUM	10.000000
.	RABBITWIBL	COST	289.000000
.	RABBITWIBL	IRON	2.400000
.	RABBITWIBL	KCALORIES	204.700000
.	RABBITWIBL	NIACIN	5.500000
.	RABBITWIBL	PHOSPHORUS	172.000000
.	RABBITWIBL	PROTEIN	20.900000
.	RABBITWIBL	RIBOFLAVIN	0.370000
.	RABBITWIBL	THIAMIN	0.150000
.	RABBITWIBL	VITAMIN_A	1101.000000
.	RABBITWIFL	ASCORBIC	1.800000
.	RABBITWIFL	AVAILABLE	0.072410
.	RABBITWIFL	CALCIUM	10.000000
.	RABBITWIFL	COST	289.000000
.	RABBITWIFL	IRON	2.400000

.	RABBITWIFL	KCALORIES	204.700000
.	RABBITWIFL	NIACIN	5.500000
.	RABBITWIFL	PHOSPHORUS	172.000000
.	RABBITWIFL	PROTEIN	20.900000
.	RABBITWIFL	RIBOFLAVIN	0.370000
.	RABBITWIFL	THIAMIN	0.150000
.	RABBITWIFL	VITAMIN_A	1101.000000
.	RABBITWIUP	ASCORBIC	1.800000
.	RABBITWIUP	AVAILABLE	0.262295
.	RABBITWIUP	CALCIUM	10.000000
.	RABBITWIUP	COST	289.000000
.	RABBITWIUP	IRON	2.400000
.	RABBITWIUP	KCALORIES	204.700000
.	RABBITWIUP	NIACIN	5.500000
.	RABBITWIUP	PHOSPHORUS	172.000000
.	RABBITWIUP	PROTEIN	20.900000
.	RABBITWIUP	RIBOFLAVIN	0.370000
.	RABBITWIUP	THIAMIN	0.150000
.	RABBITWIUP	VITAMIN_A	1101.000000
.	RACCOOFAFL	ASCORBIC	1.500000
.	RACCOOFAFL	AVAILABLE	0.150005
.	RACCOOFAFL	CALCIUM	9.000000
.	RACCOOFAFL	COST	277.000000
.	RACCOOFAFL	IRON	2.200000
.	RACCOOFAFL	KCALORIES	441.370000
.	RACCOOFAFL	NIACIN	5.050000
.	RACCOOFAFL	PHOSPHORUS	158.000000
.	RACCOOFAFL	PROTEIN	13.800000
.	RACCOOFAFL	RIBOFLAVIN	0.310000
.	RACCOOFAFL	THIAMIN	0.500000
.	RACCOOFAFL	VITAMIN_A	826.000000
.	RACCOOSPFL	ASCORBIC	1.500000
.	RACCOOSPFL	AVAILABLE	0.090005
.	RACCOOSPFL	CALCIUM	9.000000
.	RACCOOSPFL	COST	395.000000
.	RACCOOSPFL	IRON	3.700000
.	RACCOOSPFL	KCALORIES	134.290000
.	RACCOOSPFL	NIACIN	8.430000
.	RACCOOSPFL	PHOSPHORUS	264.000000
.	RACCOOSPFL	PROTEIN	23.000000
.	RACCOOSPFL	RIBOFLAVIN	0.490000
.	RACCOOSPFL	THIAMIN	0.830000
.	RACCOOSPFL	VITAMIN_A	826.000000
.	RACCOOWIFL	ASCORBIC	1.500000
.	RACCOOWIFL	AVAILABLE	0.120000
.	RACCOOWIFL	CALCIUM	11.000000
.	RACCOOWIFL	COST	430.000000
.	RACCOOWIFL	IRON	2.800000
.	RACCOOWIFL	KCALORIES	326.430000
.	RACCOOWIFL	NIACIN	6.310000
.	RACCOOWIFL	PHOSPHORUS	198.000000
.	RACCOOWIFL	PROTEIN	17.300000
.	RACCOOWIFL	RIBOFLAVIN	0.370000
.	RACCOOWIFL	THIAMIN	0.620000
.	RACCOOWIFL	VITAMIN_A	826.000000
.	SNAPPISPRI	ASCORBIC	2.000000
.	SNAPPISPRI	AVAILABLE	0.017960
.	SNAPPISPRI	CALCIUM	107.000000
.	SNAPPISPRI	COST	179.000000
.	SNAPPISPRI	IRON	2.000000
.	SNAPPISPRI	KCALORIES	69.270000
.	SNAPPISPRI	NIACIN	7.000000
.	SNAPPISPRI	PHOSPHORUS	220.000000
.	SNAPPISPRI	PROTEIN	15.800000
.	SNAPPISPRI	RIBOFLAVIN	0.710000
.	SNAPPISPRI	THIAMIN	0.220000
.	SNAPPISPRI	VITAMIN_A	19.000000
.	SOFTSHSPRI	ASCORBIC	1.700000
.	SOFTSHSPRI	AVAILABLE	0.015925

SOFTSHSPRI	CALCIUM	107.000000
SOFTSHSPRI	COST	274.000000
SOFTSHSPRI	IRON	1.500000
SOFTSHSPRI	KCALORIES	81.940000
SOFTSHSPRI	NIACIN	2.600000
SOFTSHSPRI	PHOSPHORUS	146.000000
SOFTSHSPRI	PROTEIN	17.500000
SOFTSHSPRI	RIBOFLAVIN	0.710000
SOFTSHSPRI	THIAMIN	0.250000
SOFTSHSPRI	VITAMIN_A	1652.000000
SQUIRRFABL	ASCORBIC	1.100000
SQUIRRFABL	AVAILABLE	0.213215
SQUIRRFABL	CALCIUM	13.000000
SQUIRRFABL	COST	577.000000
SQUIRRFABL	IRON	1.100000
SQUIRRFABL	KCALORIES	444.170000
SQUIRRFABL	NIACIN	2.320000
SQUIRRFABL	PHOSPHORUS	116.000000
SQUIRRFABL	PROTEIN	15.300000
SQUIRRFABL	RIBOFLAVIN	0.260000
SQUIRRFABL	THIAMIN	0.040000
SQUIRRFABL	VITAMIN_A	1101.000000
SQUIRRFAFL	ASCORBIC	1.100000
SQUIRRFAFL	AVAILABLE	0.056565
SQUIRRFAFL	CALCIUM	13.000000
SQUIRRFAFL	COST	577.000000
SQUIRRFAFL	IRON	1.100000
SQUIRRFAFL	KCALORIES	444.170000
SQUIRRFAFL	NIACIN	2.320000
SQUIRRFAFL	PHOSPHORUS	116.000000
SQUIRRFAFL	PROTEIN	15.300000
SQUIRRFAFL	RIBOFLAVIN	0.260000
SQUIRRFAFL	THIAMIN	0.040000
SQUIRRFAFL	VITAMIN_A	1101.000000
SQUIRRFAUP	ASCORBIC	1.100000
SQUIRRFAUP	AVAILABLE	0.204900
SQUIRRFAUP	CALCIUM	13.000000
SQUIRRFAUP	COST	577.000000
SQUIRRFAUP	IRON	1.100000
SQUIRRFAUP	KCALORIES	444.170000
SQUIRRFAUP	NIACIN	2.320000
SQUIRRFAUP	PHOSPHORUS	116.000000
SQUIRRFAUP	PROTEIN	15.300000
SQUIRRFAUP	RIBOFLAVIN	0.260000
SQUIRRFAUP	THIAMIN	0.040000
SQUIRRFAUP	VITAMIN_A	1101.000000
SQUIRRSPBL	ASCORBIC	1.100000
SQUIRRSPBL	AVAILABLE	0.123515
SQUIRRSPBL	CALCIUM	23.000000
SQUIRRSPBL	COST	1176.000000
SQUIRRSPBL	IRON	1.900000
SQUIRRSPBL	KCALORIES	112.660000
SQUIRRSPBL	NIACIN	4.000000
SQUIRRSPBL	PHOSPHORUS	200.000000
SQUIRRSPBL	PROTEIN	26.300000
SQUIRRSPBL	RIBOFLAVIN	0.350000
SQUIRRSPBL	THIAMIN	0.070000
SQUIRRSPBL	VITAMIN_A	1101.000000
SQUIRRSPFL	ASCORBIC	1.100000
SQUIRRSPFL	AVAILABLE	0.032765
SQUIRRSPFL	CALCIUM	23.000000
SQUIRRSPFL	COST	1176.000000
SQUIRRSPFL	IRON	1.900000
SQUIRRSPFL	KCALORIES	112.660000
SQUIRRSPFL	NIACIN	4.000000
SQUIRRSPFL	PHOSPHORUS	200.000000
SQUIRRSPFL	PROTEIN	26.300000
SQUIRRSPFL	RIBOFLAVIN	0.350000
SQUIRRSPFL	THIAMIN	0.070000

SQUIRRSPFL	VITAMIN_A	1101.000000
SQUIRRSPUP	ASCORBIC	1.100000
SQUIRRSPUP	AVAILABLE	0.118700
SQUIRRSPUP	CALCIUM	23.000000
SQUIRRSPUP	COST	1176.000000
SQUIRRSPUP	IRON	1.900000
SQUIRRSPUP	KCALORIES	112.660000
SQUIRRSPUP	NIACIN	4.000000
SQUIRRSPUP	PHOSPHORUS	200.000000
SQUIRRSPUP	PROTEIN	26.300000
SQUIRRSPUP	RIBOFLAVIN	0.350000
SQUIRRSPUP	THIAMIN	0.070000
SQUIRRSPUP	VITAMIN_A	1101.000000
SQUIRRWIBL	ASCORBIC	1.100000
SQUIRRWIBL	AVAILABLE	0.182340
SQUIRRWIBL	CALCIUM	17.000000
SQUIRRWIBL	COST	704.000000
SQUIRRWIBL	IRON	1.400000
SQUIRRWIBL	KCALORIES	336.250000
SQUIRRWIBL	NIACIN	2.960000
SQUIRRWIBL	PHOSPHORUS	148.000000
SQUIRRWIBL	PROTEIN	19.600000
SQUIRRWIBL	RIBOFLAVIN	0.300000
SQUIRRWIBL	THIAMIN	0.050000
SQUIRRWIBL	VITAMIN_A	1101.000000
SQUIRRWIFL	ASCORBIC	1.100000
SQUIRRWIFL	AVAILABLE	0.048375
SQUIRRWIFL	CALCIUM	17.000000
SQUIRRWIFL	COST	704.000000
SQUIRRWIFL	IRON	1.400000
SQUIRRWIFL	KCALORIES	336.250000
SQUIRRWIFL	NIACIN	2.960000
SQUIRRWIFL	PHOSPHORUS	148.000000
SQUIRRWIFL	PROTEIN	19.600000
SQUIRRWIFL	RIBOFLAVIN	0.300000
SQUIRRWIFL	THIAMIN	0.050000
SQUIRRWIFL	VITAMIN_A	1101.000000
SQUIRRWIUP	ASCORBIC	1.100000
SQUIRRWIUP	AVAILABLE	0.175230
SQUIRRWIUP	CALCIUM	17.000000
SQUIRRWIUP	COST	704.000000
SQUIRRWIUP	IRON	1.400000
SQUIRRWIUP	KCALORIES	336.250000
SQUIRRWIUP	NIACIN	2.960000
SQUIRRWIUP	PHOSPHORUS	148.000000
SQUIRRWIUP	PROTEIN	19.600000
SQUIRRWIUP	RIBOFLAVIN	0.300000
SQUIRRWIUP	THIAMIN	0.050000
SQUIRRWIUP	VITAMIN_A	1101.000000
TERRAPSPRI	ASCORBIC	1.700000
TERRAPSPRI	AVAILABLE	0.423050
TERRAPSPRI	CALCIUM	107.000000
TERRAPSPRI	COST	165.000000
TERRAPSPRI	IRON	3.200000
TERRAPSPRI	KCALORIES	110.990000
TERRAPSPRI	NIACIN	4.800000
TERRAPSPRI	PHOSPHORUS	183.000000
TERRAPSPRI	PROTEIN	18.600000
TERRAPSPRI	RIBOFLAVIN	0.690000
TERRAPSPRI	THIAMIN	0.240000
TERRAPSPRI	VITAMIN_A	1652.000000
TUBERFAFL	ASCORBIC	4.000000
TUBERFAFL	AVAILABLE	2.824660
TUBERFAFL	CALCIUM	14.000000
TUBERFAFL	COST	85.000000
TUBERFAFL	IRON	3.400000
TUBERFAFL	KCALORIES	69.900000
TUBERFAFL	NIACIN	1.300000
TUBERFAFL	PHOSPHORUS	78.000000

TUBERFAFL	PROTEIN	2.300000
TUBERFAFL	RIBOFLAVIN	0.060000
TUBERFAFL	THIAMIN	0.200000
TUBERFAFL	VITAMIN_A	20.000000
TUBERSPFL	ASCORBIC	4.000000
TUBERSPFL	AVAILABLE	2.720080
TUBERSPFL	CALCIUM	14.000000
TUBERSPFL	COST	60.000000
TUBERSPFL	IRON	3.400000
TUBERSPFL	KCALORIES	69.900000
TUBERSPFL	NIACIN	1.300000
TUBERSPFL	PHOSPHORUS	78.000000
TUBERSPFL	PROTEIN	2.300000
TUBERSPFL	RIBOFLAVIN	0.060000
TUBERSPFL	THIAMIN	0.200000
TUBERSPFL	VITAMIN_A	20.000000
TUBERWIFL	ASCORBIC	4.000000
TUBERWIFL	AVAILABLE	1.778610
TUBERWIFL	CALCIUM	14.000000
TUBERWIFL	COST	85.000000
TUBERWIFL	IRON	3.400000
TUBERWIFL	KCALORIES	69.900000
TUBERWIFL	NIACIN	1.300000
TUBERWIFL	PHOSPHORUS	78.000000
TUBERWIFL	PROTEIN	2.300000
TUBERWIFL	RIBOFLAVIN	0.060000
TUBERWIFL	THIAMIN	0.200000
TUBERWIFL	VITAMIN_A	20.000000
TURKEYFAFL	ASCORBIC	1.800000
TURKEYFAFL	AVAILABLE	0.116845
TURKEYFAFL	CALCIUM	6.000000
TURKEYFAFL	COST	181.000000
TURKEYFAFL	IRON	1.200000
TURKEYFAFL	KCALORIES	342.850000
TURKEYFAFL	NIACIN	6.120000
TURKEYFAFL	PHOSPHORUS	162.000000
TURKEYFAFL	PROTEIN	18.400000
TURKEYFAFL	RIBOFLAVIN	0.130000
TURKEYFAFL	THIAMIN	0.060000
TURKEYFAFL	VITAMIN_A	531.000000
TURKEYFAUP	ASCORBIC	1.800000
TURKEYFAUP	AVAILABLE	0.423270
TURKEYFAUP	CALCIUM	6.000000
TURKEYFAUP	COST	181.000000
TURKEYFAUP	IRON	1.200000
TURKEYFAUP	KCALORIES	342.850000
TURKEYFAUP	NIACIN	6.120000
TURKEYFAUP	PHOSPHORUS	162.000000
TURKEYFAUP	PROTEIN	18.400000
TURKEYFAUP	RIBOFLAVIN	0.130000
TURKEYFAUP	THIAMIN	0.060000
TURKEYFAUP	VITAMIN_A	531.000000
TURKEYSPFL	ASCORBIC	1.800000
TURKEYSPFL	AVAILABLE	0.093810
TURKEYSPFL	CALCIUM	8.000000
TURKEYSPFL	COST	248.000000
TURKEYSPFL	IRON	1.400000
TURKEYSPFL	KCALORIES	226.490000
TURKEYSPFL	NIACIN	7.420000
TURKEYSPFL	PHOSPHORUS	197.000000
TURKEYSPFL	PROTEIN	22.200000
TURKEYSPFL	RIBOFLAVIN	0.160000
TURKEYSPFL	THIAMIN	0.080000
TURKEYSPFL	VITAMIN_A	531.000000
TURKEYSPUP	ASCORBIC	1.800000
TURKEYSPUP	AVAILABLE	0.339830
TURKEYSPUP	CALCIUM	8.000000
TURKEYSPUP	COST	248.000000
TURKEYSPUP	IRON	1.400000

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.     TURKEYSPUP   KCALORIES          226.490000
.     TURKEYSPUP   NIACIN              7.420000
.     TURKEYSPUP   PHOSPHORUS        197.000000
.     TURKEYSPUP   PROTEIN            22.200000
.     TURKEYSPUP   RIBOFLAVIN          0.160000
.     TURKEYSPUP   THIAMIN             0.080000
.     TURKEYSPUP   VITAMIN_A         531.000000
.     TURKEYWIFL   ASCORBIC            1.800000
.     TURKEYWIFL   AVAILABLE           0.116845
.     TURKEYWIFL   CALCIUM             6.000000
.     TURKEYWIFL   COST              216.000000
.     TURKEYWIFL   IRON                1.200000
.     TURKEYWIFL   KCALORIES         342.850000
.     TURKEYWIFL   NIACIN              6.120000
.     TURKEYWIFL   PHOSPHORUS        162.000000
.     TURKEYWIFL   PROTEIN            18.400000
.     TURKEYWIFL   RIBOFLAVIN          0.130000
.     TURKEYWIFL   THIAMIN             0.060000
.     TURKEYWIFL   VITAMIN_A         531.000000
.     TURKEYWIUP   ASCORBIC            1.800000
.     TURKEYWIUP   AVAILABLE           0.423270
.     TURKEYWIUP   CALCIUM             6.000000
.     TURKEYWIUP   COST              216.000000
.     TURKEYWIUP   IRON                1.200000
.     TURKEYWIUP   KCALORIES         342.850000
.     TURKEYWIUP   NIACIN              6.120000
.     TURKEYWIUP   PHOSPHORUS        162.000000
.     TURKEYWIUP   PROTEIN            18.400000
.     TURKEYWIUP   RIBOFLAVIN          0.130000
.     TURKEYWIUP   THIAMIN             0.060000
.     TURKEYWIUP   VITAMIN_A         531.000000
.     WALNUTFAFL   ASCORBIC            2.000000
.     WALNUTFAFL   AVAILABLE         137.465940
.     WALNUTFAFL   CALCIUM             0.000000
.     WALNUTFAFL   COST              897.000000
.     WALNUTFAFL   IRON                6.000000
.     WALNUTFAFL   KCALORIES         627.720000
.     WALNUTFAFL   NIACIN              0.700000
.     WALNUTFAFL   PHOSPHORUS        570.000000
.     WALNUTFAFL   PROTEIN            20.500000
.     WALNUTFAFL   RIBOFLAVIN          0.110000
.     WALNUTFAFL   THIAMIN             0.220000
.     WALNUTFAFL   VITAMIN_A         300.000000
.     _RHS_        COST                0
.     _RHS_        KCALORIES        1386
.     _RHS_        PROTEIN            26.46
.     _RHS_        CALCIUM          541.8
.     _RHS_        PHOSPHORUS       541.8
.     _RHS_        IRON               8.19
.     _RHS_        VITAMIN_A        1827
.     _RHS_        THIAMIN             .567
.     _RHS_        RIBOFLAVIN          .630
.     _RHS_        NIACIN             7.56
.     _RHS_        ASCORBIC           18.9
PROC LP SPARSEDATA RANGEPRICE;
RUN;
/*
```

```
//R137FSUM JOB (,,5,1),PRENTICE,CLASS=2,
//       USER=POTTERY,PASSWORD=
/*ROUTE PRINT NER.R0
// EXEC SAS
DATA;
  INPUT _TYPE_ $ @10 _COL_ $13. @24 _ROW_ $16. _COEF_;
  CARDS;
MIN     .              COST                .
GE      .              KCALORIES           .
GE      .              PROTEIN             .
GE      .              CALCIUM             .
GE      .              PHOSPHORUS          .
GE      .              IRON                .
GE      .              VITAMIN_A           .
GE      .              THIAMIN             .
GE      .              RIBOFLAVIN          .
GE      .              NIACIN              .
GE      .              ASCORBIC            .
UPPERBD .              AVAILABLE           .
.       AMARANSUFL     ASCORBIC          98.700000
.       AMARANSUFL     AVAILABLE          3.784210
.       AMARANSUFL     CALCIUM          210.000000
.       AMARANSUFL     COST              44.000000
.       AMARANSUFL     IRON               2.300000
.       AMARANSUFL     KCALORIES         33.870000
.       AMARANSUFL     NIACIN             1.270000
.       AMARANSUFL     PHOSPHORUS        52.000000
.       AMARANSUFL     PROTEIN            3.400000
.       AMARANSUFL     RIBOFLAVIN         0.310000
.       AMARANSUFL     THIAMIN            0.110000
.       AMARANSUFL     VITAMIN_A       8800.000000
.       BEARSPBL       ASCORBIC           1.300000
.       BEARSPBL       AVAILABLE          0.124290
.       BEARSPBL       CALCIUM           12.000000
.       BEARSPBL       COST             475.000000
.       BEARSPBL       IRON               3.000000
.       BEARSPBL       KCALORIES        134.290000
.       BEARSPBL       NIACIN             6.820000
.       BEARSPBL       PHOSPHORUS       213.000000
.       BEARSPBL       PROTEIN           23.000000
.       BEARSPBL       RIBOFLAVIN         0.470000
.       BEARSPBL       THIAMIN            0.850000
.       BEARSPBL       VITAMIN_A        551.000000
.       BEARSPFL       ASCORBIC           1.300000
.       BEARSPFL       AVAILABLE          0.032975
.       BEARSPFL       CALCIUM           12.000000
.       BEARSPFL       COST             475.000000
.       BEARSPFL       IRON               3.000000
.       BEARSPFL       KCALORIES        134.290000
.       BEARSPFL       NIACIN             6.820000
.       BEARSPFL       PHOSPHORUS       213.000000
.       BEARSPFL       PROTEIN           23.000000
.       BEARSPFL       RIBOFLAVIN         0.470000
.       BEARSPFL       THIAMIN            0.850000
.       BEARSPFL       VITAMIN_A        551.000000
.       BEARSPUP       ASCORBIC           1.300000
.       BEARSPUP       AVAILABLE          0.119445
.       BEARSPUP       CALCIUM           12.000000
.       BEARSPUP       COST             475.000000
.       BEARSPUP       IRON               3.000000
.       BEARSPUP       KCALORIES        134.290000
.       BEARSPUP       NIACIN             6.820000
.       BEARSPUP       PHOSPHORUS       213.000000
.       BEARSPUP       PROTEIN           23.000000
.       BEARSPUP       RIBOFLAVIN         0.470000
.       BEARSPUP       THIAMIN            0.850000
.       BEARSPUP       VITAMIN_A        551.000000
.       BEARSUBL       ASCORBIC           1.300000
.       BEARSUBL       AVAILABLE          0.131300
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BEARSUBL	CALCIUM	11.000000
BEARSUBL	COST	416.000000
BEARSUBL	IRON	2.600000
BEARSUBL	KCALORIES	214.240000
BEARSUBL	NIACIN	6.060000
BEARSUBL	PHOSPHORUS	190.000000
BEARSUBL	PROTEIN	20.600000
BEARSUBL	RIBOFLAVIN	0.420000
BEARSUBL	THIAMIN	0.760000
BEARSUBL	VITAMIN_A	551.000000
BEARSUFL	ASCORBIC	1.300000
BEARSUFL	AVAILABLE	0.034830
BEARSUFL	CALCIUM	11.000000
BEARSUFL	COST	416.000000
BEARSUFL	IRON	2.600000
BEARSUFL	KCALORIES	214.240000
BEARSUFL	NIACIN	6.060000
BEARSUFL	PHOSPHORUS	190.000000
BEARSUFL	PROTEIN	20.600000
BEARSUFL	RIBOFLAVIN	0.420000
BEARSUFL	THIAMIN	0.760000
BEARSUFL	VITAMIN_A	551.000000
BEARSUUP	ASCORBIC	1.300000
BEARSUUP	AVAILABLE	0.126180
BEARSUUP	CALCIUM	11.000000
BEARSUUP	COST	416.000000
BEARSUUP	IRON	2.600000
BEARSUUP	KCALORIES	214.240000
BEARSUUP	NIACIN	6.060000
BEARSUUP	PHOSPHORUS	190.000000
BEARSUUP	PROTEIN	20.600000
BEARSUUP	RIBOFLAVIN	0.420000
BEARSUUP	THIAMIN	0.760000
BEARSUUP	VITAMIN_A	551.000000
BEARWIBL	ASCORBIC	1.300000
BEARWIBL	AVAILABLE	0.145300
BEARWIBL	CALCIUM	10.000000
BEARWIBL	COST	239.000000
BEARWIBL	IRON	2.400000
BEARWIBL	KCALORIES	254.200000
BEARWIBL	NIACIN	5.560000
BEARWIBL	PHOSPHORUS	174.000000
BEARWIBL	PROTEIN	19.400000
BEARWIBL	RIBOFLAVIN	0.390000
BEARWIBL	THIAMIN	0.720000
BEARWIBL	VITAMIN_A	551.000000
BEARWIFL	ASCORBIC	1.300000
BEARWIFL	AVAILABLE	0.038545
BEARWIFL	CALCIUM	10.000000
BEARWIFL	COST	239.000000
BEARWIFL	IRON	2.400000
BEARWIFL	KCALORIES	254.200000
BEARWIFL	NIACIN	5.560000
BEARWIFL	PHOSPHORUS	174.000000
BEARWIFL	PROTEIN	19.400000
BEARWIFL	RIBOFLAVIN	0.390000
BEARWIFL	THIAMIN	0.720000
BEARWIFL	VITAMIN_A	551.000000
BEARWIUP	ASCORBIC	1.300000
BEARWIUP	AVAILABLE	0.139635
BEARWIUP	CALCIUM	10.000000
BEARWIUP	COST	239.000000
BEARWIUP	IRON	2.400000
BEARWIUP	KCALORIES	254.200000
BEARWIUP	NIACIN	5.560000
BEARWIUP	PHOSPHORUS	174.000000
BEARWIUP	PROTEIN	19.400000
BEARWIUP	RIBOFLAVIN	0.390000
BEARWIUP	THIAMIN	0.720000

BEARWIUP	VITAMIN_A	551.000000
BEAVERSPRI	ASCORBIC	1.800000
BEAVERSPRI	AVAILABLE	0.008570
BEAVERSPRI	CALCIUM	9.000000
BEAVERSPRI	COST	205.000000
BEAVERSPRI	IRON	2.200000
BEAVERSPRI	KCALORIES	200.100000
BEAVERSPRI	NIACIN	5.050000
BEAVERSPRI	PHOSPHORUS	158.000000
BEAVERSPRI	PROTEIN	21.300000
BEAVERSPRI	RIBOFLAVIN	0.390000
BEAVERSPRI	THIAMIN	0.100000
BEAVERSPRI	VITAMIN_A	1101.000000
BEAVERSURI	ASCORBIC	1.800000
BEAVERSURI	AVAILABLE	0.008570
BEAVERSURI	CALCIUM	9.000000
BEAVERSURI	COST	170.000000
BEAVERSURI	IRON	2.200000
BEAVERSURI	KCALORIES	200.100000
BEAVERSURI	NIACIN	5.050000
BEAVERSURI	PHOSPHORUS	158.000000
BEAVERSURI	PROTEIN	21.300000
BEAVERSURI	RIBOFLAVIN	0.390000
BEAVERSURI	THIAMIN	0.100000
BEAVERSURI	VITAMIN_A	1101.000000
BEAVERWIRI	ASCORBIC	1.800000
BEAVERWIRI	AVAILABLE	0.008570
BEAVERWIRI	CALCIUM	9.000000
BEAVERWIRI	COST	205.000000
BEAVERWIRI	IRON	2.200000
BEAVERWIRI	KCALORIES	200.100000
BEAVERWIRI	NIACIN	5.050000
BEAVERWIRI	PHOSPHORUS	158.000000
BEAVERWIRI	PROTEIN	21.300000
BEAVERWIRI	RIBOFLAVIN	0.390000
BEAVERWIRI	THIAMIN	0.100000
BEAVERWIRI	VITAMIN_A	1101.000000
BERRIESUFL	ASCORBIC	21.000000
BERRIESUFL	AVAILABLE	0.072200
BERRIESUFL	CALCIUM	32.000000
BERRIESUFL	COST	65.000000
BERRIESUFL	IRON	0.900000
BERRIESUFL	KCALORIES	58.000000
BERRIESUFL	NIACIN	0.400000
BERRIESUFL	PHOSPHORUS	10.000000
BERRIESUFL	PROTEIN	1.200000
BERRIESUFL	RIBOFLAVIN	0.040000
BERRIESUFL	THIAMIN	0.030000
BERRIESUFL	VITAMIN_A	200.000000
BLACKCSUFL	ASCORBIC	10.000000
BLACKCSUFL	AVAILABLE	72.198500
BLACKCSUFL	CALCIUM	22.000000
BLACKCSUFL	COST	60.000000
BLACKCSUFL	IRON	0.400000
BLACKCSUFL	KCALORIES	69.520000
BLACKCSUFL	NIACIN	0.400000
BLACKCSUFL	PHOSPHORUS	19.000000
BLACKCSUFL	PROTEIN	1.300000
BLACKCSUFL	RIBOFLAVIN	0.060000
BLACKCSUFL	THIAMIN	0.050000
BLACKCSUFL	VITAMIN_A	110.000000
BLUEBESUBL	ASCORBIC	21.100000
BLUEBESUBL	AVAILABLE	0.272150
BLUEBESUBL	CALCIUM	23.000000
BLUEBESUBL	COST	65.000000
BLUEBESUBL	IRON	1.600000
BLUEBESUBL	KCALORIES	95.120000
BLUEBESUBL	NIACIN	0.740000
BLUEBESUBL	PHOSPHORUS	20.000000

BLUEBESUBL	PROTEIN	1.060000
BLUEBESUBL	RIBOFLAVIN	0.100000
BLUEBESUBL	THIAMIN	0.040000
BLUEBESUBL	VITAMIN_A	158.500000
BOXTURSUBL	ASCORBIC	1.700000
BOXTURSUBL	AVAILABLE	0.448140
BOXTURSUBL	CALCIUM	107.000000
BOXTURSUBL	COST	600.000000
BOXTURSUBL	IRON	3.200000
BOXTURSUBL	KCALORIES	110.990000
BOXTURSUBL	NIACIN	4.800000
BOXTURSUBL	PHOSPHORUS	183.000000
BOXTURSUBL	PROTEIN	18.200000
BOXTURSUBL	RIBOFLAVIN	0.690000
BOXTURSUBL	THIAMIN	0.240000
BOXTURSUBL	VITAMIN_A	1652.000000
BOXTURSUFL	ASCORBIC	1.700000
BOXTURSUFL	AVAILABLE	0.118887
BOXTURSUFL	CALCIUM	107.000000
BOXTURSUFL	COST	600.000000
BOXTURSUFL	IRON	3.200000
BOXTURSUFL	KCALORIES	110.990000
BOXTURSUFL	NIACIN	4.800000
BOXTURSUFL	PHOSPHORUS	183.000000
BOXTURSUFL	PROTEIN	18.200000
BOXTURSUFL	RIBOFLAVIN	0.690000
BOXTURSUFL	THIAMIN	0.240000
BOXTURSUFL	VITAMIN_A	1652.000000
BOXTURSUUP	ASCORBIC	1.700000
BOXTURSUUP	AVAILABLE	0.430667
BOXTURSUUP	CALCIUM	107.000000
BOXTURSUUP	COST	600.000000
BOXTURSUUP	IRON	3.200000
BOXTURSUUP	KCALORIES	110.990000
BOXTURSUUP	NIACIN	4.800000
BOXTURSUUP	PHOSPHORUS	183.000000
BOXTURSUUP	PROTEIN	18.200000
BOXTURSUUP	RIBOFLAVIN	0.690000
BOXTURSUUP	THIAMIN	0.240000
BOXTURSUUP	VITAMIN_A	1652.000000
C_PODGSUFL	ASCORBIC	98.700000
C_PODGSUFL	AVAILABLE	0.787830
C_PODGSUFL	CALCIUM	210.000000
C_PODGSUFL	COST	44.000000
C_PODGSUFL	IRON	2.300000
C_PODGSUFL	KCALORIES	33.870000
C_PODGSUFL	NIACIN	1.270000
C_PODGSUFL	PHOSPHORUS	52.000000
C_PODGSUFL	PROTEIN	3.400000
C_PODGSUFL	RIBOFLAVIN	0.310000
C_PODGSUFL	THIAMIN	0.110000
C_PODGSUFL	VITAMIN_A	8800.000000
DEERSPFL	ASCORBIC	0.000000
DEERSPFL	AVAILABLE	0.406635
DEERSPFL	CALCIUM	10.000000
DEERSPFL	COST	132.000000
DEERSPFL	IRON	2.600000
DEERSPFL	KCALORIES	125.750000
DEERSPFL	NIACIN	6.300000
DEERSPFL	PHOSPHORUS	249.000000
DEERSPFL	PROTEIN	21.000000
DEERSPFL	RIBOFLAVIN	0.510000
DEERSPFL	THIAMIN	0.230000
DEERSPFL	VITAMIN_A	826.000000
DEERSUFL	ASCORBIC	1.500000
DEERSUFL	AVAILABLE	0.412020
DEERSUFL	CALCIUM	10.000000
DEERSUFL	COST	96.000000
DEERSUFL	IRON	2.600000

.	DEERSUFL	KCALORIES	138.430000
.	DEERSUFL	NIACIN	6.240000
.	DEERSUFL	PHOSPHORUS	246.000000
.	DEERSUFL	PROTEIN	20.800000
.	DEERSUFL	RIBOFLAVIN	0.510000
.	DEERSUFL	THIAMIN	0.230000
.	DEERSUFL	VITAMIN_A	826.000000
.	DEERWIUP	ASCORBIC	1.500000
.	DEERWIUP	AVAILABLE	1.624435
.	DEERWIUP	CALCIUM	9.000000
.	DEERWIUP	COST	160.000000
.	DEERWIUP	IRON	2.400000
.	DEERWIUP	KCALORIES	198.340000
.	DEERWIUP	NIACIN	5.730000
.	DEERWIUP	PHOSPHORUS	227.000000
.	DEERWIUP	PROTEIN	19.200000
.	DEERWIUP	RIBOFLAVIN	0.470000
.	DEERWIUP	THIAMIN	0.210000
.	DEERWIUP	VITAMIN_A	826.000000
.	DUCKSURI	ASCORBIC	2.100000
.	DUCKSURI	AVAILABLE	0.177620
.	DUCKSURI	CALCIUM	10.000000
.	DUCKSURI	COST	4178.000000
.	DUCKSURI	IRON	1.600000
.	DUCKSURI	KCALORIES	254.260000
.	DUCKSURI	NIACIN	6.700000
.	DUCKSURI	PHOSPHORUS	176.000000
.	DUCKSURI	PROTEIN	20.200000
.	DUCKSURI	RIBOFLAVIN	0.290000
.	DUCKSURI	THIAMIN	0.080000
.	DUCKSURI	VITAMIN_A	1377.000000
.	FISHSPRI	ASCORBIC	3.000000
.	FISHSPRI	AVAILABLE	30.710150
.	FISHSPRI	CALCIUM	15.000000
.	FISHSPRI	COST	89.000000
.	FISHSPRI	IRON	1.500000
.	FISHSPRI	KCALORIES	153.620000
.	FISHSPRI	NIACIN	3.000000
.	FISHSPRI	PHOSPHORUS	200.000000
.	FISHSPRI	PROTEIN	17.600000
.	FISHSPRI	RIBOFLAVIN	0.120000
.	FISHSPRI	THIAMIN	0.050000
.	FISHSPRI	VITAMIN_A	21.000000
.	FISHSURI	ASCORBIC	3.000000
.	FISHSURI	AVAILABLE	30.710150
.	FISHSURI	CALCIUM	15.000000
.	FISHSURI	COST	28.000000
.	FISHSURI	IRON	1.500000
.	FISHSURI	KCALORIES	153.620000
.	FISHSURI	NIACIN	3.000000
.	FISHSURI	PHOSPHORUS	200.000000
.	FISHSURI	PROTEIN	17.600000
.	FISHSURI	RIBOFLAVIN	0.120000
.	FISHSURI	THIAMIN	0.050000
.	FISHSURI	VITAMIN_A	21.000000
.	GRAPESUFL	ASCORBIC	4.000000
.	GRAPESUFL	AVAILABLE	0.463730
.	GRAPESUFL	CALCIUM	16.000000
.	GRAPESUFL	COST	28.000000
.	GRAPESUFL	IRON	0.100000
.	GRAPESUFL	KCALORIES	69.260000
.	GRAPESUFL	NIACIN	0.300000
.	GRAPESUFL	PHOSPHORUS	12.000000
.	GRAPESUFL	PROTEIN	1.300000
.	GRAPESUFL	RIBOFLAVIN	0.030000
.	GRAPESUFL	THIAMIN	0.050000
.	GRAPESUFL	VITAMIN_A	100.000000
.	GREENSSUFL	ASCORBIC	94.000000
.	GREENSSUFL	AVAILABLE	0.516940

GREENSSUFL	CALCIUM	74.000000
GREENSSUFL	COST	100.000000
GREENSSUFL	IRON	1.400000
GREENSSUFL	KCALORIES	29.860000
GREENSSUFL	NIACIN	0.750000
GREENSSUFL	PHOSPHORUS	58.000000
GREENSSUFL	PROTEIN	2.400000
GREENSSUFL	RIBOFLAVIN	0.240000
GREENSSUFL	THIAMIN	0.080000
GREENSSUFL	VITAMIN_A	11100.000000
MUSKRASPRI	ASCORBIC	1.500000
MUSKRASPRI	AVAILABLE	0.472240
MUSKRASPRI	CALCIUM	9.000000
MUSKRASPRI	COST	543.000000
MUSKRASPRI	IRON	2.200000
MUSKRASPRI	KCALORIES	117.440000
MUSKRASPRI	NIACIN	5.040000
MUSKRASPRI	PHOSPHORUS	158.000000
MUSKRASPRI	PROTEIN	19.900000
MUSKRASPRI	RIBOFLAVIN	0.200000
MUSKRASPRI	THIAMIN	0.210000
MUSKRASPRI	VITAMIN_A	826.000000
MUSKRASURI	ASCORBIC	1.500000
MUSKRASURI	AVAILABLE	0.472240
MUSKRASURI	CALCIUM	9.000000
MUSKRASURI	COST	480.000000
MUSKRASURI	IRON	2.200000
MUSKRASURI	KCALORIES	117.440000
MUSKRASURI	NIACIN	5.040000
MUSKRASURI	PHOSPHORUS	158.000000
MUSKRASURI	PROTEIN	19.900000
MUSKRASURI	RIBOFLAVIN	0.200000
MUSKRASURI	THIAMIN	0.210000
MUSKRASURI	VITAMIN_A	826.000000
MUSKRAWIRI	ASCORBIC	1.500000
MUSKRAWIRI	AVAILABLE	0.472240
MUSKRAWIRI	CALCIUM	9.000000
MUSKRAWIRI	COST	543.000000
MUSKRAWIRI	IRON	2.200000
MUSKRAWIRI	KCALORIES	117.440000
MUSKRAWIRI	NIACIN	5.040000
MUSKRAWIRI	PHOSPHORUS	158.000000
MUSKRAWIRI	PROTEIN	19.900000
MUSKRAWIRI	RIBOFLAVIN	0.200000
MUSKRAWIRI	THIAMIN	0.210000
MUSKRAWIRI	VITAMIN_A	826.000000
MUSSELSURI	ASCORBIC	0.300000
MUSSELSURI	AVAILABLE	116.984290
MUSSELSURI	CALCIUM	845.000000
MUSSELSURI	COST	40.000000
MUSSELSURI	IRON	19.460000
MUSSELSURI	KCALORIES	73.800000
MUSSELSURI	NIACIN	1.450000
MUSSELSURI	PHOSPHORUS	445.600000
MUSSELSURI	PROTEIN	9.000000
MUSSELSURI	RIBOFLAVIN	0.250000
MUSSELSURI	THIAMIN	0.000000
MUSSELSURI	VITAMIN_A	17.000000
OPOSSUSPFL	ASCORBIC	1.800000
OPOSSUSPFL	AVAILABLE	0.055730
OPOSSUSPFL	CALCIUM	11.000000
OPOSSUSPFL	COST	304.000000
OPOSSUSPFL	IRON	2.600000
OPOSSUSPFL	KCALORIES	134.290000
OPOSSUSPFL	NIACIN	6.060000
OPOSSUSPFL	PHOSPHORUS	190.000000
OPOSSUSPFL	PROTEIN	23.000000
OPOSSUSPFL	RIBOFLAVIN	0.400000
OPOSSUSPFL	THIAMIN	0.000000

OPOSSUSPFL	VITAMIN_A	1101.000000
OPOSSUSUFL	ASCORBIC	1.800000
OPOSSUSUFL	AVAILABLE	0.055730
OPOSSUSUFL	CALCIUM	10.000000
OPOSSUSUFL	COST	269.000000
OPOSSUSUFL	IRON	2.500000
OPOSSUSUFL	KCALORIES	169.710000
OPOSSUSUFL	NIACIN	5.760000
OPOSSUSUFL	PHOSPHORUS	180.000000
OPOSSUSUFL	PROTEIN	22.000000
OPOSSUSUFL	RIBOFLAVIN	0.390000
OPOSSUSUFL	THIAMIN	0.160000
OPOSSUSUFL	VITAMIN_A	1101.000000
OPOSSUWIFL	ASCORBIC	1.800000
OPOSSUWIFL	AVAILABLE	0.055730
OPOSSUWIFL	CALCIUM	10.000000
OPOSSUWIFL	COST	289.000000
OPOSSUWIFL	IRON	2.400000
OPOSSUWIFL	KCALORIES	204.700000
OPOSSUWIFL	NIACIN	5.500000
OPOSSUWIFL	PHOSPHORUS	172.000000
OPOSSUWIFL	PROTEIN	20.900000
OPOSSUWIFL	RIBOFLAVIN	0.370000
OPOSSUWIFL	THIAMIN	0.150000
OPOSSUWIFL	VITAMIN_A	1101.000000
RABBITSPBL	ASCORBIC	1.800000
RABBITSPBL	AVAILABLE	0.211435
RABBITSPBL	CALCIUM	11.000000
RABBITSPBL	COST	304.000000
RABBITSPBL	IRON	2.600000
RABBITSPBL	KCALORIES	134.290000
RABBITSPBL	NIACIN	6.060000
RABBITSPBL	PHOSPHORUS	190.000000
RABBITSPBL	PROTEIN	23.000000
RABBITSPBL	RIBOFLAVIN	0.400000
RABBITSPBL	THIAMIN	0.000000
RABBITSPBL	VITAMIN_A	1101.000000
RABBITSPFL	ASCORBIC	1.800000
RABBITSPFL	AVAILABLE	0.056090
RABBITSPFL	CALCIUM	11.000000
RABBITSPFL	COST	304.000000
RABBITSPFL	IRON	2.600000
RABBITSPFL	KCALORIES	134.290000
RABBITSPFL	NIACIN	6.060000
RABBITSPFL	PHOSPHORUS	190.000000
RABBITSPFL	PROTEIN	23.000000
RABBITSPFL	RIBOFLAVIN	0.400000
RABBITSPFL	THIAMIN	0.000000
RABBITSPFL	VITAMIN_A	1101.000000
RABBITSPUP	ASCORBIC	1.800000
RABBITSPUP	AVAILABLE	0.203190
RABBITSPUP	CALCIUM	11.000000
RABBITSPUP	COST	304.000000
RABBITSPUP	IRON	2.600000
RABBITSPUP	KCALORIES	134.290000
RABBITSPUP	NIACIN	6.060000
RABBITSPUP	PHOSPHORUS	190.000000
RABBITSPUP	PROTEIN	23.000000
RABBITSPUP	RIBOFLAVIN	0.400000
RABBITSPUP	THIAMIN	0.000000
RABBITSPUP	VITAMIN_A	1101.000000
RABBITSUBL	ASCORBIC	1.800000
RABBITSUBL	AVAILABLE	0.211435
RABBITSUBL	CALCIUM	10.000000
RABBITSUBL	COST	269.000000
RABBITSUBL	IRON	2.500000
RABBITSUBL	KCALORIES	169.710000
RABBITSUBL	NIACIN	5.760000
RABBITSUBL	PHOSPHORUS	180.000000

.	RABBITSUBL	PROTEIN	22.000000
.	RABBITSUBL	RIBOFLAVIN	0.390000
.	RABBITSUBL	THIAMIN	0.160000
.	RABBITSUBL	VITAMIN_A	1101.000000
.	RABBITSUFL	ASCORBIC	1.800000
.	RABBITSUFL	AVAILABLE	0.056090
.	RABBITSUFL	CALCIUM	10.000000
.	RABBITSUFL	COST	269.000000
.	RABBITSUFL	IRON	2.500000
.	RABBITSUFL	KCALORIES	169.710000
.	RABBITSUFL	NIACIN	5.760000
.	RABBITSUFL	PHOSPHORUS	180.000000
.	RABBITSUFL	PROTEIN	22.000000
.	RABBITSUFL	RIBOFLAVIN	0.390000
.	RABBITSUFL	THIAMIN	0.160000
.	RABBITSUFL	VITAMIN_A	1101.000000
.	RABBITSUUP	ASCORBIC	1.800000
.	RABBITSUUP	AVAILABLE	0.203190
.	RABBITSUUP	CALCIUM	10.000000
.	RABBITSUUP	COST	269.000000
.	RABBITSUUP	IRON	2.500000
.	RABBITSUUP	KCALORIES	169.710000
.	RABBITSUUP	NIACIN	5.760000
.	RABBITSUUP	PHOSPHORUS	180.000000
.	RABBITSUUP	PROTEIN	22.000000
.	RABBITSUUP	RIBOFLAVIN	0.390000
.	RABBITSUUP	THIAMIN	0.160000
.	RABBITSUUP	VITAMIN_A	1101.000000
.	RABBITWIBL	ASCORBIC	1.800000
.	RABBITWIBL	AVAILABLE	0.272940
.	RABBITWIBL	CALCIUM	10.000000
.	RABBITWIBL	COST	289.000000
.	RABBITWIBL	IRON	2.400000
.	RABBITWIBL	KCALORIES	204.700000
.	RABBITWIBL	NIACIN	5.500000
.	RABBITWIBL	PHOSPHORUS	172.000000
.	RABBITWIBL	PROTEIN	20.900000
.	RABBITWIBL	RIBOFLAVIN	0.370000
.	RABBITWIBL	THIAMIN	0.150000
.	RABBITWIBL	VITAMIN_A	1101.000000
.	RABBITWIFL	ASCORBIC	1.800000
.	RABBITWIFL	AVAILABLE	0.072410
.	RABBITWIFL	CALCIUM	10.000000
.	RABBITWIFL	COST	289.000000
.	RABBITWIFL	IRON	2.400000
.	RABBITWIFL	KCALORIES	204.700000
.	RABBITWIFL	NIACIN	5.500000
.	RABBITWIFL	PHOSPHORUS	172.000000
.	RABBITWIFL	PROTEIN	20.900000
.	RABBITWIFL	RIBOFLAVIN	0.370000
.	RABBITWIFL	THIAMIN	0.150000
.	RABBITWIFL	VITAMIN_A	1101.000000
.	RABBITWIUP	ASCORBIC	1.800000
.	RABBITWIUP	AVAILABLE	0.262295
.	RABBITWIUP	CALCIUM	10.000000
.	RABBITWIUP	COST	289.000000
.	RABBITWIUP	IRON	2.400000
.	RABBITWIUP	KCALORIES	204.700000
.	RABBITWIUP	NIACIN	5.500000
.	RABBITWIUP	PHOSPHORUS	172.000000
.	RABBITWIUP	PROTEIN	20.900000
.	RABBITWIUP	RIBOFLAVIN	0.370000
.	RABBITWIUP	THIAMIN	0.150000
.	RABBITWIUP	VITAMIN_A	1101.000000
.	RACCOOSPFL	ASCORBIC	1.500000
.	RACCOOSPFL	AVAILABLE	0.090005
.	RACCOOSPFL	CALCIUM	9.000000
.	RACCOOSPFL	COST	430.000000
.	RACCOOSPFL	IRON	3.700000

RACCOOSPFL	KCALORIES	134.290000
RACCOOSPFL	NIACIN	8.430000
RACCOOSPFL	PHOSPHORUS	264.000000
RACCOOSPFL	PROTEIN	23.000000
RACCOOSPFL	RIBOFLAVIN	0.490000
RACCOOSPFL	THIAMIN	0.830000
RACCOOSPFL	VITAMIN_A	826.000000
RACCOOSUFL	ASCORBIC	1.500000
RACCOOSUFL	AVAILABLE	0.094365
RACCOOSUFL	CALCIUM	10.000000
RACCOOSUFL	COST	378.000000
RACCOOSUFL	IRON	2.500000
RACCOOSUFL	KCALORIES	373.670000
RACCOOSUFL	NIACIN	5.810000
RACCOOSUFL	PHOSPHORUS	182.000000
RACCOOSUFL	PROTEIN	15.900000
RACCOOSUFL	RIBOFLAVIN	0.350000
RACCOOSUFL	THIAMIN	0.570000
RACCOOSUFL	VITAMIN_A	826.000000
RACCOOWIFL	ASCORBIC	1.500000
RACCOOWIFL	AVAILABLE	0.120000
RACCOOWIFL	CALCIUM	11.000000
RACCOOWIFL	COST	430.000000
RACCOOWIFL	IRON	2.800000
RACCOOWIFL	KCALORIES	326.430000
RACCOOWIFL	NIACIN	6.310000
RACCOOWIFL	PHOSPHORUS	198.000000
RACCOOWIFL	PROTEIN	17.300000
RACCOOWIFL	RIBOFLAVIN	0.370000
RACCOOWIFL	THIAMIN	0.620000
RACCOOWIFL	VITAMIN_A	826.000000
SNAPPISURI	ASCORBIC	2.000000
SNAPPISURI	AVAILABLE	0.017960
SNAPPISURI	CALCIUM	107.000000
SNAPPISURI	COST	179.000000
SNAPPISURI	IRON	2.000000
SNAPPISURI	KCALORIES	69.270000
SNAPPISURI	NIACIN	7.000000
SNAPPISURI	PHOSPHORUS	220.000000
SNAPPISURI	PROTEIN	15.800000
SNAPPISURI	RIBOFLAVIN	0.710000
SNAPPISURI	THIAMIN	0.220000
SNAPPISURI	VITAMIN_A	19.000000
SOFTSHSURI	ASCORBIC	1.700000
SOFTSHSURI	AVAILABLE	0.015925
SOFTSHSURI	CALCIUM	107.000000
SOFTSHSURI	COST	274.000000
SOFTSHSURI	IRON	1.500000
SOFTSHSURI	KCALORIES	81.940000
SOFTSHSURI	NIACIN	2.600000
SOFTSHSURI	PHOSPHORUS	146.000000
SOFTSHSURI	PROTEIN	17.500000
SOFTSHSURI	RIBOFLAVIN	0.710000
SOFTSHSURI	THIAMIN	0.250000
SOFTSHSURI	VITAMIN_A	1652.000000
SQUIRRSPBL	ASCORBIC	1.100000
SQUIRRSPBL	AVAILABLE	0.123515
SQUIRRSPBL	CALCIUM	23.000000
SQUIRRSPBL	COST	1211.000000
SQUIRRSPBL	IRON	1.900000
SQUIRRSPBL	KCALORIES	112.660000
SQUIRRSPBL	NIACIN	4.000000
SQUIRRSPBL	PHOSPHORUS	200.000000
SQUIRRSPBL	PROTEIN	26.300000
SQUIRRSPBL	RIBOFLAVIN	0.350000
SQUIRRSPBL	THIAMIN	0.070000
SQUIRRSPBL	VITAMIN_A	1101.000000
SQUIRRSPFL	ASCORBIC	1.100000
SQUIRRSPFL	AVAILABLE	0.032765

SQUIRRSPFL	CALCIUM	23.000000
SQUIRRSPFL	COST	1211.000000
SQUIRRSPFL	IRON	1.900000
SQUIRRSPFL	KCALORIES	112.660000
SQUIRRSPFL	NIACIN	4.000000
SQUIRRSPFL	PHOSPHORUS	200.000000
SQUIRRSPFL	PROTEIN	26.300000
SQUIRRSPFL	RIBOFLAVIN	0.350000
SQUIRRSPFL	THIAMIN	0.070000
SQUIRRSPFL	VITAMIN_A	1101.000000
SQUIRRSPUP	ASCORBIC	1.100000
SQUIRRSPUP	AVAILABLE	0.118700
SQUIRRSPUP	CALCIUM	23.000000
SQUIRRSPUP	COST	1211.000000
SQUIRRSPUP	IRON	1.900000
SQUIRRSPUP	KCALORIES	112.660000
SQUIRRSPUP	NIACIN	4.000000
SQUIRRSPUP	PHOSPHORUS	200.000000
SQUIRRSPUP	PROTEIN	26.300000
SQUIRRSPUP	RIBOFLAVIN	0.350000
SQUIRRSPUP	THIAMIN	0.070000
SQUIRRSPUP	VITAMIN_A	1101.000000
SQUIRRSUBL	ASCORBIC	1.100000
SQUIRRSUBL	AVAILABLE	0.168230
SQUIRRSUBL	CALCIUM	18.000000
SQUIRRSUBL	COST	1000.000000
SQUIRRSUBL	IRON	1.500000
SQUIRRSUBL	KCALORIES	278.240000
SQUIRRSUBL	NIACIN	3.160000
SQUIRRSUBL	PHOSPHORUS	158.000000
SQUIRRSUBL	PROTEIN	20.800000
SQUIRRSUBL	RIBOFLAVIN	0.380000
SQUIRRSUBL	THIAMIN	0.060000
SQUIRRSUBL	VITAMIN_A	1101.000000
SQUIRRSUFL	ASCORBIC	1.100000
SQUIRRSUFL	AVAILABLE	0.044630
SQUIRRSUFL	CALCIUM	18.000000
SQUIRRSUFL	COST	1000.000000
SQUIRRSUFL	IRON	1.500000
SQUIRRSUFL	KCALORIES	278.240000
SQUIRRSUFL	NIACIN	3.160000
SQUIRRSUFL	PHOSPHORUS	158.000000
SQUIRRSUFL	PROTEIN	20.800000
SQUIRRSUFL	RIBOFLAVIN	0.380000
SQUIRRSUFL	THIAMIN	0.060000
SQUIRRSUFL	VITAMIN_A	1101.000000
SQUIRRSUUP	ASCORBIC	1.100000
SQUIRRSUUP	AVAILABLE	0.161670
SQUIRRSUUP	CALCIUM	18.000000
SQUIRRSUUP	COST	1000.000000
SQUIRRSUUP	IRON	1.500000
SQUIRRSUUP	KCALORIES	278.240000
SQUIRRSUUP	NIACIN	3.160000
SQUIRRSUUP	PHOSPHORUS	158.000000
SQUIRRSUUP	PROTEIN	20.800000
SQUIRRSUUP	RIBOFLAVIN	0.380000
SQUIRRSUUP	THIAMIN	0.060000
SQUIRRSUUP	VITAMIN_A	1101.000000
SQUIRRWIBL	ASCORBIC	1.100000
SQUIRRWIBL	AVAILABLE	0.182340
SQUIRRWIBL	CALCIUM	17.000000
SQUIRRWIBL	COST	704.000000
SQUIRRWIBL	IRON	1.400000
SQUIRRWIBL	KCALORIES	336.250000
SQUIRRWIBL	NIACIN	2.960000
SQUIRRWIBL	PHOSPHORUS	148.000000
SQUIRRWIBL	PROTEIN	19.600000
SQUIRRWIBL	RIBOFLAVIN	0.300000
SQUIRRWIBL	THIAMIN	0.050000

.	SQUIRRWIBL	VITAMIN_A	1101.000000
.	SQUIRRWIFL	ASCORBIC	1.100000
.	SQUIRRWIFL	AVAILABLE	0.048375
.	SQUIRRWIFL	CALCIUM	17.000000
.	SQUIRRWIFL	COST	704.000000
.	SQUIRRWIFL	IRON	1.400000
.	SQUIRRWIFL	KCALORIES	336.250000
.	SQUIRRWIFL	NIACIN	2.960000
.	SQUIRRWIFL	PHOSPHORUS	148.000000
.	SQUIRRWIFL	PROTEIN	19.600000
.	SQUIRRWIFL	RIBOFLAVIN	0.300000
.	SQUIRRWIFL	THIAMIN	0.050000
.	SQUIRRWIFL	VITAMIN_A	1101.000000
.	SQUIRRWIUP	ASCORBIC	1.100000
.	SQUIRRWIUP	AVAILABLE	0.175230
.	SQUIRRWIUP	CALCIUM	17.000000
.	SQUIRRWIUP	COST	704.000000
.	SQUIRRWIUP	IRON	1.400000
.	SQUIRRWIUP	KCALORIES	336.250000
.	SQUIRRWIUP	NIACIN	2.960000
.	SQUIRRWIUP	PHOSPHORUS	148.000000
.	SQUIRRWIUP	PROTEIN	19.600000
.	SQUIRRWIUP	RIBOFLAVIN	0.300000
.	SQUIRRWIUP	THIAMIN	0.050000
.	SQUIRRWIUP	VITAMIN_A	1101.000000
.	TERRAPSURI	ASCORBIC	1.700000
.	TERRAPSURI	AVAILABLE	0.423050
.	TERRAPSURI	CALCIUM	107.000000
.	TERRAPSURI	COST	165.000000
.	TERRAPSURI	IRON	3.200000
.	TERRAPSURI	KCALORIES	110.990000
.	TERRAPSURI	NIACIN	4.800000
.	TERRAPSURI	PHOSPHORUS	183.000000
.	TERRAPSURI	PROTEIN	18.600000
.	TERRAPSURI	RIBOFLAVIN	0.690000
.	TERRAPSURI	THIAMIN	0.240000
.	TERRAPSURI	VITAMIN_A	1652.000000
.	TUBERSPFL	ASCORBIC	4.000000
.	TUBERSPFL	AVAILABLE	2.720080
.	TUBERSPFL	CALCIUM	14.000000
.	TUBERSPFL	COST	85.000000
.	TUBERSPFL	IRON	3.400000
.	TUBERSPFL	KCALORIES	69.900000
.	TUBERSPFL	NIACIN	1.300000
.	TUBERSPFL	PHOSPHORUS	78.000000
.	TUBERSPFL	PROTEIN	2.300000
.	TUBERSPFL	RIBOFLAVIN	0.060000
.	TUBERSPFL	THIAMIN	0.200000
.	TUBERSPFL	VITAMIN_A	20.000000
.	TUBERSUFL	ASCORBIC	4.000000
.	TUBERSUFL	AVAILABLE	0.523150
.	TUBERSUFL	CALCIUM	14.000000
.	TUBERSUFL	COST	60.000000
.	TUBERSUFL	IRON	3.400000
.	TUBERSUFL	KCALORIES	69.900000
.	TUBERSUFL	NIACIN	1.300000
.	TUBERSUFL	PHOSPHORUS	78.000000
.	TUBERSUFL	PROTEIN	2.300000
.	TUBERSUFL	RIBOFLAVIN	0.060000
.	TUBERSUFL	THIAMIN	0.200000
.	TUBERSUFL	VITAMIN_A	20.000000
.	TUBERWIFL	ASCORBIC	4.000000
.	TUBERWIFL	AVAILABLE	1.778610
.	TUBERWIFL	CALCIUM	14.000000
.	TUBERWIFL	COST	85.000000
.	TUBERWIFL	IRON	3.400000
.	TUBERWIFL	KCALORIES	69.900000
.	TUBERWIFL	NIACIN	1.300000
.	TUBERWIFL	PHOSPHORUS	78.000000

TUBERWIFL	PROTEIN	2.300000
TUBERWIFL	RIBOFLAVIN	0.060000
TUBERWIFL	THIAMIN	0.200000
TUBERWIFL	VITAMIN_A	20.000000
TURKEYSPFL	ASCORBIC	1.800000
TURKEYSPFL	AVAILABLE	0.093810
TURKEYSPFL	CALCIUM	8.000000
TURKEYSPFL	COST	283.000000
TURKEYSPFL	IRON	1.400000
TURKEYSPFL	KCALORIES	226.490000
TURKEYSPFL	NIACIN	7.420000
TURKEYSPFL	PHOSPHORUS	197.000000
TURKEYSPFL	PROTEIN	22.200000
TURKEYSPFL	RIBOFLAVIN	0.160000
TURKEYSPFL	THIAMIN	0.080000
TURKEYSPFL	VITAMIN_A	531.000000
TURKEYSPUP	ASCORBIC	1.800000
TURKEYSPUP	AVAILABLE	0.339830
TURKEYSPUP	CALCIUM	8.000000
TURKEYSPUP	COST	283.000000
TURKEYSPUP	IRON	1.400000
TURKEYSPUP	KCALORIES	226.490000
TURKEYSPUP	NIACIN	7.420000
TURKEYSPUP	PHOSPHORUS	197.000000
TURKEYSPUP	PROTEIN	22.200000
TURKEYSPUP	RIBOFLAVIN	0.160000
TURKEYSPUP	THIAMIN	0.080000
TURKEYSPUP	VITAMIN_A	531.000000
TURKEYSUFL	ASCORBIC	1.800000
TURKEYSUFL	AVAILABLE	0.070680
TURKEYSUFL	CALCIUM	8.000000
TURKEYSUFL	COST	290.000000
TURKEYSUFL	IRON	1.500000
TURKEYSUFL	KCALORIES	158.310000
TURKEYSUFL	NIACIN	8.160000
TURKEYSUFL	PHOSPHORUS	216.000000
TURKEYSUFL	PROTEIN	24.400000
TURKEYSUFL	RIBOFLAVIN	0.170000
TURKEYSUFL	THIAMIN	0.080000
TURKEYSUFL	VITAMIN_A	531.000000
TURKEYSUUP	ASCORBIC	1.800000
TURKEYSUUP	AVAILABLE	0.256045
TURKEYSUUP	CALCIUM	8.000000
TURKEYSUUP	COST	290.000000
TURKEYSUUP	IRON	1.500000
TURKEYSUUP	KCALORIES	158.310000
TURKEYSUUP	NIACIN	8.160000
TURKEYSUUP	PHOSPHORUS	216.000000
TURKEYSUUP	PROTEIN	24.400000
TURKEYSUUP	RIBOFLAVIN	0.170000
TURKEYSUUP	THIAMIN	0.080000
TURKEYSUUP	VITAMIN_A	531.000000
TURKEYWIFL	ASCORBIC	1.800000
TURKEYWIFL	AVAILABLE	0.116845
TURKEYWIFL	CALCIUM	6.000000
TURKEYWIFL	COST	216.000000
TURKEYWIFL	IRON	1.200000
TURKEYWIFL	KCALORIES	342.850000
TURKEYWIFL	NIACIN	6.120000
TURKEYWIFL	PHOSPHORUS	162.000000
TURKEYWIFL	PROTEIN	18.400000
TURKEYWIFL	RIBOFLAVIN	0.130000
TURKEYWIFL	THIAMIN	0.060000
TURKEYWIFL	VITAMIN_A	531.000000
TURKEYWIUP	ASCORBIC	1.800000
TURKEYWIUP	AVAILABLE	0.423270
TURKEYWIUP	CALCIUM	6.000000
TURKEYWIUP	COST	216.000000
TURKEYWIUP	IRON	1.200000

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.     TURKEYWIUP   KCALORIES          342.850000
.     TURKEYWIUP   NIACIN              6.120000
.     TURKEYWIUP   PHOSPHORUS        162.000000
.     TURKEYWIUP   PROTEIN            18.400000
.     TURKEYWIUP   RIBOFLAVIN          0.130000
.     TURKEYWIUP   THIAMIN             0.060000
.     TURKEYWIUP   VITAMIN_A         531.000000
.     _RHS_        COST                0
.     _RHS_        KCALORIES        1386
.     _RHS_        PROTEIN            26.46
.     _RHS_        CALCIUM          541.8
.     _RHS_        PHOSPHORUS       541.8
.     _RHS_        IRON               8.19
.     _RHS_        VITAMIN_A        1827
.     _RHS_        THIAMIN             .567
.     _RHS_        RIBOFLAVIN          .630
.     _RHS_        NIACIN             7.56
.     _RHS_        ASCORBIC           18.9
PROC LP SPARSEDATA RANGEPRICE;
RUN;
/*
```

```
//R137FWIN JOB (,,5,1),PRENTICE,CLASS=2,
//       USER=POTTERY,PASSWORD=
/*ROUTE PRINT NER.R0
// EXEC SAS
DATA;
  INPUT _TYPE_ $ @10 _COL_ $13. @24 _ROW_ $16. _COEF_;
  CARDS;
MIN     .              COST                .
GE      .              KCALORIES           .
GE      .              PROTEIN             .
GE      .              CALCIUM             .
GE      .              PHOSPHORUS          .
GE      .              IRON                .
GE      .              VITAMIN_A           .
GE      .              THIAMIN             .
GE      .              RIBOFLAVIN          .
GE      .              NIACIN              .
GE      .              ASCORBIC            .
UPPERBD .              AVAILABLE           .
.       BEARFABL       ASCORBIC          1.300000
.       BEARFABL       AVAILABLE         0.166295
.       BEARFABL       CALCIUM           9.000000
.       BEARFABL       COST            363.000000
.       BEARFABL       IRON              2.200000
.       BEARFABL       KCALORIES       334.170000
.       BEARFABL       NIACIN            5.050000
.       BEARFABL       PHOSPHORUS      158.000000
.       BEARFABL       PROTEIN          17.000000
.       BEARFABL       RIBOFLAVIN        0.340000
.       BEARFABL       THIAMIN           0.620000
.       BEARFABL       VITAMIN_A       551.000000
.       BEARFAFL       ASCORBIC          1.300000
.       BEARFAFL       AVAILABLE         0.044115
.       BEARFAFL       CALCIUM           9.000000
.       BEARFAFL       COST            363.000000
.       BEARFAFL       IRON              2.200000
.       BEARFAFL       KCALORIES       334.170000
.       BEARFAFL       NIACIN            5.050000
.       BEARFAFL       PHOSPHORUS      158.000000
.       BEARFAFL       PROTEIN          17.000000
.       BEARFAFL       RIBOFLAVIN        0.340000
.       BEARFAFL       THIAMIN           0.620000
.       BEARFAFL       VITAMIN_A       551.000000
.       BEARFAUP       ASCORBIC          1.300000
.       BEARFAUP       AVAILABLE         0.159810
.       BEARFAUP       CALCIUM           9.000000
.       BEARFAUP       COST            363.000000
.       BEARFAUP       IRON              2.200000
.       BEARFAUP       KCALORIES       334.170000
.       BEARFAUP       NIACIN            5.050000
.       BEARFAUP       PHOSPHORUS      158.000000
.       BEARFAUP       PROTEIN          17.000000
.       BEARFAUP       RIBOFLAVIN        0.340000
.       BEARFAUP       THIAMIN           0.620000
.       BEARFAUP       VITAMIN_A       551.000000
.       BEARSUBL       ASCORBIC          1.300000
.       BEARSUBL       AVAILABLE         0.131300
.       BEARSUBL       CALCIUM          11.000000
.       BEARSUBL       COST            431.000000
.       BEARSUBL       IRON              2.600000
.       BEARSUBL       KCALORIES       214.240000
.       BEARSUBL       NIACIN            6.060000
.       BEARSUBL       PHOSPHORUS      190.000000
.       BEARSUBL       PROTEIN          20.600000
.       BEARSUBL       RIBOFLAVIN        0.420000
.       BEARSUBL       THIAMIN           0.760000
.       BEARSUBL       VITAMIN_A       551.000000
.       BEARSUFL       ASCORBIC          1.300000
.       BEARSUFL       AVAILABLE         0.034830
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BEARSUFL	CALCIUM	11.000000
BEARSUFL	COST	431.000000
BEARSUFL	IRON	2.600000
BEARSUFL	KCALORIES	214.240000
BEARSUFL	NIACIN	6.060000
BEARSUFL	PHOSPHORUS	190.000000
BEARSUFL	PROTEIN	20.600000
BEARSUFL	RIBOFLAVIN	0.420000
BEARSUFL	THIAMIN	0.760000
BEARSUFL	VITAMIN_A	551.000000
BEARSUUP	ASCORBIC	1.300000
BEARSUUP	AVAILABLE	0.126180
BEARSUUP	CALCIUM	11.000000
BEARSUUP	COST	431.000000
BEARSUUP	IRON	2.600000
BEARSUUP	KCALORIES	214.240000
BEARSUUP	NIACIN	6.060000
BEARSUUP	PHOSPHORUS	190.000000
BEARSUUP	PROTEIN	20.600000
BEARSUUP	RIBOFLAVIN	0.420000
BEARSUUP	THIAMIN	0.760000
BEARSUUP	VITAMIN_A	551.000000
BEARWIBL	ASCORBIC	1.300000
BEARWIBL	AVAILABLE	0.145300
BEARWIBL	CALCIUM	10.000000
BEARWIBL	COST	169.000000
BEARWIBL	IRON	2.400000
BEARWIBL	KCALORIES	254.200000
BEARWIBL	NIACIN	5.560000
BEARWIBL	PHOSPHORUS	174.000000
BEARWIBL	PROTEIN	19.400000
BEARWIBL	RIBOFLAVIN	0.390000
BEARWIBL	THIAMIN	0.720000
BEARWIBL	VITAMIN_A	551.000000
BEARWIFL	ASCORBIC	1.300000
BEARWIFL	AVAILABLE	0.038545
BEARWIFL	CALCIUM	10.000000
BEARWIFL	COST	169.000000
BEARWIFL	IRON	2.400000
BEARWIFL	KCALORIES	254.200000
BEARWIFL	NIACIN	5.560000
BEARWIFL	PHOSPHORUS	174.000000
BEARWIFL	PROTEIN	19.400000
BEARWIFL	RIBOFLAVIN	0.390000
BEARWIFL	THIAMIN	0.720000
BEARWIFL	VITAMIN_A	551.000000
BEARWIUP	ASCORBIC	1.300000
BEARWIUP	AVAILABLE	0.139635
BEARWIUP	CALCIUM	10.000000
BEARWIUP	COST	169.000000
BEARWIUP	IRON	2.400000
BEARWIUP	KCALORIES	254.200000
BEARWIUP	NIACIN	5.560000
BEARWIUP	PHOSPHORUS	174.000000
BEARWIUP	PROTEIN	19.400000
BEARWIUP	RIBOFLAVIN	0.390000
BEARWIUP	THIAMIN	0.720000
BEARWIUP	VITAMIN_A	551.000000
BEAVERFARI	ASCORBIC	1.800000
BEAVERFARI	AVAILABLE	0.008570
BEAVERFARI	CALCIUM	9.000000
BEAVERFARI	COST	205.000000
BEAVERFARI	IRON	2.200000
BEAVERFARI	KCALORIES	200.100000
BEAVERFARI	NIACIN	5.050000
BEAVERFARI	PHOSPHORUS	158.000000
BEAVERFARI	PROTEIN	21.300000
BEAVERFARI	RIBOFLAVIN	0.390000
BEAVERFARI	THIAMIN	0.100000

.	BEAVERFARI	VITAMIN_A	1101.000000
.	BEAVERSURI	ASCORBIC	1.800000
.	BEAVERSURI	AVAILABLE	0.008570
.	BEAVERSURI	CALCIUM	9.000000
.	BEAVERSURI	COST	205.000000
.	BEAVERSURI	IRON	2.200000
.	BEAVERSURI	KCALORIES	200.100000
.	BEAVERSURI	NIACIN	5.050000
.	BEAVERSURI	PHOSPHORUS	158.000000
.	BEAVERSURI	PROTEIN	21.300000
.	BEAVERSURI	RIBOFLAVIN	0.390000
.	BEAVERSURI	THIAMIN	0.100000
.	BEAVERSURI	VITAMIN_A	1101.000000
.	BEAVERWIRI	ASCORBIC	1.800000
.	BEAVERWIRI	AVAILABLE	0.008570
.	BEAVERWIRI	CALCIUM	9.000000
.	BEAVERWIRI	COST	170.000000
.	BEAVERWIRI	IRON	2.200000
.	BEAVERWIRI	KCALORIES	200.100000
.	BEAVERWIRI	NIACIN	5.050000
.	BEAVERWIRI	PHOSPHORUS	158.000000
.	BEAVERWIRI	PROTEIN	21.300000
.	BEAVERWIRI	RIBOFLAVIN	0.390000
.	BEAVERWIRI	THIAMIN	0.100000
.	BEAVERWIRI	VITAMIN_A	1101.000000
.	BERRIESUFL	ASCORBIC	21.000000
.	BERRIESUFL	AVAILABLE	0.072200
.	BERRIESUFL	CALCIUM	32.000000
.	BERRIESUFL	COST	81.000000
.	BERRIESUFL	IRON	0.900000
.	BERRIESUFL	KCALORIES	58.000000
.	BERRIESUFL	NIACIN	0.400000
.	BERRIESUFL	PHOSPHORUS	10.000000
.	BERRIESUFL	PROTEIN	1.200000
.	BERRIESUFL	RIBOFLAVIN	0.040000
.	BERRIESUFL	THIAMIN	0.030000
.	BERRIESUFL	VITAMIN_A	200.000000
.	BLACKCSUFL	ASCORBIC	10.000000
.	BLACKCSUFL	AVAILABLE	72.198500
.	BLACKCSUFL	CALCIUM	22.000000
.	BLACKCSUFL	COST	74.000000
.	BLACKCSUFL	IRON	0.400000
.	BLACKCSUFL	KCALORIES	69.520000
.	BLACKCSUFL	NIACIN	0.400000
.	BLACKCSUFL	PHOSPHORUS	19.000000
.	BLACKCSUFL	PROTEIN	1.300000
.	BLACKCSUFL	RIBOFLAVIN	0.060000
.	BLACKCSUFL	THIAMIN	0.050000
.	BLACKCSUFL	VITAMIN_A	110.000000
.	BLUEBESUBL	ASCORBIC	21.100000
.	BLUEBESUBL	AVAILABLE	0.272150
.	BLUEBESUBL	CALCIUM	23.000000
.	BLUEBESUBL	COST	81.000000
.	BLUEBESUBL	IRON	1.600000
.	BLUEBESUBL	KCALORIES	95.120000
.	BLUEBESUBL	NIACIN	0.740000
.	BLUEBESUBL	PHOSPHORUS	20.000000
.	BLUEBESUBL	PROTEIN	1.060000
.	BLUEBESUBL	RIBOFLAVIN	0.100000
.	BLUEBESUBL	THIAMIN	0.040000
.	BLUEBESUBL	VITAMIN_A	158.500000
.	C_PODSFAFL	ASCORBIC	0.000000
.	C_PODSFAFL	AVAILABLE	577.790160
.	C_PODSFAFL	CALCIUM	128.000000
.	C_PODSFAFL	COST	163.000000
.	C_PODSFAFL	IRON	12.800000
.	C_PODSFAFL	KCALORIES	362.690000
.	C_PODSFAFL	NIACIN	1.470000
.	C_PODSFAFL	PHOSPHORUS	442.000000

C_PODSFAFL	PROTEIN	12.600000
C_PODSFAFL	RIBOFLAVIN	6.430000
C_PODSFAFL	THIAMIN	0.650000
C_PODSFAFL	VITAMIN_A	20.000000
DEERFAUP	ASCORBIC	1.500000
DEERFAUP	AVAILABLE	1.767090
DEERFAUP	CALCIUM	8.000000
DEERFAUP	COST	118.000000
DEERFAUP	IRON	2.200000
DEERFAUP	KCALORIES	255.550000
DEERFAUP	NIACIN	5.290000
DEERFAUP	PHOSPHORUS	209.000000
DEERFAUP	PROTEIN	17.600000
DEERFAUP	RIBOFLAVIN	0.430000
DEERFAUP	THIAMIN	0.200000
DEERFAUP	VITAMIN_A	826.000000
DEERSUFL	ASCORBIC	1.500000
DEERSUFL	AVAILABLE	0.412020
DEERSUFL	CALCIUM	10.000000
DEERSUFL	COST	111.000000
DEERSUFL	IRON	2.600000
DEERSUFL	KCALORIES	138.430000
DEERSUFL	NIACIN	6.240000
DEERSUFL	PHOSPHORUS	246.000000
DEERSUFL	PROTEIN	20.800000
DEERSUFL	RIBOFLAVIN	0.510000
DEERSUFL	THIAMIN	0.230000
DEERSUFL	VITAMIN_A	826.000000
DEERWIUP	ASCORBIC	1.500000
DEERWIUP	AVAILABLE	1.624435
DEERWIUP	CALCIUM	9.000000
DEERWIUP	COST	90.000000
DEERWIUP	IRON	2.400000
DEERWIUP	KCALORIES	198.340000
DEERWIUP	NIACIN	5.730000
DEERWIUP	PHOSPHORUS	227.000000
DEERWIUP	PROTEIN	19.200000
DEERWIUP	RIBOFLAVIN	0.470000
DEERWIUP	THIAMIN	0.210000
DEERWIUP	VITAMIN_A	826.000000
DUCKWIRI	ASCORBIC	2.100000
DUCKWIRI	AVAILABLE	0.177620
DUCKWIRI	CALCIUM	10.000000
DUCKWIRI	COST	4178.000000
DUCKWIRI	IRON	1.600000
DUCKWIRI	KCALORIES	254.260000
DUCKWIRI	NIACIN	6.700000
DUCKWIRI	PHOSPHORUS	176.000000
DUCKWIRI	PROTEIN	20.200000
DUCKWIRI	RIBOFLAVIN	0.290000
DUCKWIRI	THIAMIN	0.080000
DUCKWIRI	VITAMIN_A	1377.000000
FISHFARI	ASCORBIC	3.000000
FISHFARI	AVAILABLE	30.710150
FISHFARI	CALCIUM	15.000000
FISHFARI	COST	63.000000
FISHFARI	IRON	1.500000
FISHFARI	KCALORIES	153.620000
FISHFARI	NIACIN	3.000000
FISHFARI	PHOSPHORUS	200.000000
FISHFARI	PROTEIN	17.600000
FISHFARI	RIBOFLAVIN	0.120000
FISHFARI	THIAMIN	0.060000
FISHFARI	VITAMIN_A	21.000000
FISHSURI	ASCORBIC	3.000000
FISHSURI	AVAILABLE	30.710150
FISHSURI	CALCIUM	15.000000
FISHSURI	COST	63.000000
FISHSURI	IRON	1.500000

.	FISHSURI	KCALORIES	153.620000
.	FISHSURI	NIACIN	3.000000
.	FISHSURI	PHOSPHORUS	200.000000
.	FISHSURI	PROTEIN	17.600000
.	FISHSURI	RIBOFLAVIN	0.120000
.	FISHSURI	THIAMIN	0.050000
.	FISHSURI	VITAMIN_A	21.000000
.	GRAPESUFL	ASCORBIC	4.000000
.	GRAPESUFL	AVAILABLE	0.463730
.	GRAPESUFL	CALCIUM	16.000000
.	GRAPESUFL	COST	46.000000
.	GRAPESUFL	IRON	0.100000
.	GRAPESUFL	KCALORIES	69.260000
.	GRAPESUFL	NIACIN	0.300000
.	GRAPESUFL	PHOSPHORUS	12.000000
.	GRAPESUFL	PROTEIN	1.300000
.	GRAPESUFL	RIBOFLAVIN	0.030000
.	GRAPESUFL	THIAMIN	0.050000
.	GRAPESUFL	VITAMIN_A	100.000000
.	HAWTHOFAFL	ASCORBIC	22.300000
.	HAWTHOFAFL	AVAILABLE	0.072200
.	HAWTHOFAFL	CALCIUM	85.000000
.	HAWTHOFAFL	COST	81.000000
.	HAWTHOFAFL	IRON	2.100000
.	HAWTHOFAFL	KCALORIES	92.000000
.	HAWTHOFAFL	NIACIN	0.430000
.	HAWTHOFAFL	PHOSPHORUS	25.000000
.	HAWTHOFAFL	PROTEIN	0.400000
.	HAWTHOFAFL	RIBOFLAVIN	0.050000
.	HAWTHOFAFL	THIAMIN	0.050000
.	HAWTHOFAFL	VITAMIN_A	303.000000
.	HAZELNFAFL	ASCORBIC	0.000000
.	HAZELNFAFL	AVAILABLE	0.243020
.	HAZELNFAFL	CALCIUM	209.000000
.	HAZELNFAFL	COST	1287.000000
.	HAZELNFAFL	IRON	3.400000
.	HAZELNFAFL	KCALORIES	633.980000
.	HAZELNFAFL	NIACIN	0.900000
.	HAZELNFAFL	PHOSPHORUS	337.000000
.	HAZELNFAFL	PROTEIN	12.600000
.	HAZELNFAFL	RIBOFLAVIN	0.410000
.	HAZELNFAFL	THIAMIN	0.460000
.	HAZELNFAFL	VITAMIN_A	25.000000
.	HICKORFAUP	ASCORBIC	0.000000
.	HICKORFAUP	AVAILABLE	69.030210
.	HICKORFAUP	CALCIUM	0.000000
.	HICKORFAUP	COST	277.000000
.	HICKORFAUP	IRON	2.400000
.	HICKORFAUP	KCALORIES	672.920000
.	HICKORFAUP	NIACIN	0.800000
.	HICKORFAUP	PHOSPHORUS	360.000000
.	HICKORFAUP	PROTEIN	13.200000
.	HICKORFAUP	RIBOFLAVIN	0.110000
.	HICKORFAUP	THIAMIN	0.340000
.	HICKORFAUP	VITAMIN_A	150.000000
.	MUSKRAFARI	ASCORBIC	1.500000
.	MUSKRAFARI	AVAILABLE	0.472240
.	MUSKRAFARI	CALCIUM	9.000000
.	MUSKRAFARI	COST	543.000000
.	MUSKRAFARI	IRON	2.200000
.	MUSKRAFARI	KCALORIES	117.440000
.	MUSKRAFARI	NIACIN	6.040000
.	MUSKRAFARI	PHOSPHORUS	158.000000
.	MUSKRAFARI	PROTEIN	19.900000
.	MUSKRAFARI	RIBOFLAVIN	0.200000
.	MUSKRAFARI	THIAMIN	0.210000
.	MUSKRAFARI	VITAMIN_A	826.000000
.	MUSKRASURI	ASCORBIC	1.500000
.	MUSKRASURI	AVAILABLE	0.472240

.	MUSKRASURI	CALCIUM	9.000000
.	MUSKRASURI	COST	543.000000
.	MUSKRASURI	IRON	2.200000
.	MUSKRASURI	KCALORIES	117.440000
.	MUSKRASURI	NIACIN	5.040000
.	MUSKRASURI	PHOSPHORUS	158.000000
.	MUSKRASURI	PROTEIN	19.900000
.	MUSKRASURI	RIBOFLAVIN	0.200000
.	MUSKRASURI	THIAMIN	0.210000
.	MUSKRASURI	VITAMIN_A	826.000000
.	MUSKRAWIRI	ASCORBIC	1.500000
.	MUSKRAWIRI	AVAILABLE	0.472240
.	MUSKRAWIRI	CALCIUM	9.000000
.	MUSKRAWIRI	COST	480.000000
.	MUSKRAWIRI	IRON	2.200000
.	MUSKRAWIRI	KCALORIES	117.440000
.	MUSKRAWIRI	NIACIN	5.040000
.	MUSKRAWIRI	PHOSPHORUS	158.000000
.	MUSKRAWIRI	PROTEIN	19.900000
.	MUSKRAWIRI	RIBOFLAVIN	0.200000
.	MUSKRAWIRI	THIAMIN	0.210000
.	MUSKRAWIRI	VITAMIN_A	826.000000
.	OPOSSUFAFL	ASCORBIC	1.800000
.	OPOSSUFAFL	AVAILABLE	0.055730
.	OPOSSUFAFL	CALCIUM	9.000000
.	OPOSSUFAFL	COST	219.000000
.	OPOSSUFAFL	IRON	2.200000
.	OPOSSUFAFL	KCALORIES	262.380000
.	OPOSSUFAFL	NIACIN	35.050000
.	OPOSSUFAFL	PHOSPHORUS	158.000000
.	OPOSSUFAFL	PROTEIN	19.200000
.	OPOSSUFAFL	RIBOFLAVIN	0.340000
.	OPOSSUFAFL	THIAMIN	0.140000
.	OPOSSUFAFL	VITAMIN_A	1101.000000
.	OPOSSUSUFL	ASCORBIC	1.800000
.	OPOSSUSUFL	AVAILABLE	0.055730
.	OPOSSUSUFL	CALCIUM	10.000000
.	OPOSSUSUFL	COST	284.000000
.	OPOSSUSUFL	IRON	2.500000
.	OPOSSUSUFL	KCALORIES	169.710000
.	OPOSSUSUFL	NIACIN	5.760000
.	OPOSSUSUFL	PHOSPHORUS	180.000000
.	OPOSSUSUFL	PROTEIN	22.000000
.	OPOSSUSUFL	RIBOFLAVIN	0.390000
.	OPOSSUSUFL	THIAMIN	0.160000
.	OPOSSUSUFL	VITAMIN_A	1101.000000
.	OPOSSUWIFL	ASCORBIC	1.800000
.	OPOSSUWIFL	AVAILABLE	0.055730
.	OPOSSUWIFL	CALCIUM	10.000000
.	OPOSSUWIFL	COST	219.000000
.	OPOSSUWIFL	IRON	2.400000
.	OPOSSUWIFL	KCALORIES	204.700000
.	OPOSSUWIFL	NIACIN	5.500000
.	OPOSSUWIFL	PHOSPHORUS	172.000000
.	OPOSSUWIFL	PROTEIN	20.900000
.	OPOSSUWIFL	RIBOFLAVIN	0.370000
.	OPOSSUWIFL	THIAMIN	0.150000
.	OPOSSUWIFL	VITAMIN_A	1101.000000
.	PLUMFAFL	ASCORBIC	4.000000
.	PLUMFAFL	AVAILABLE	1.010780
.	PLUMFAFL	CALCIUM	12.000000
.	PLUMFAFL	COST	46.000000
.	PLUMFAFL	IRON	0.500000
.	PLUMFAFL	KCALORIES	75.280000
.	PLUMFAFL	NIACIN	0.500000
.	PLUMFAFL	PHOSPHORUS	18.000000
.	PLUMFAFL	PROTEIN	0.800000
.	PLUMFAFL	RIBOFLAVIN	0.030000
.	PLUMFAFL	THIAMIN	0.030000

.	PLUMFAFL	VITAMIN_A	300.000000
.	RABBITFABL	ASCORBIC	1.800000
.	RABBITFABL	AVAILABLE	0.272940
.	RABBITFABL	CALCIUM	9.000000
.	RABBITFABL	COST	219.000000
.	RABBITFABL	IRON	2.200000
.	RABBITFABL	KCALORIES	262.380000
.	RABBITFABL	NIACIN	35.050000
.	RABBITFABL	PHOSPHORUS	158.000000
.	RABBITFABL	PROTEIN	19.200000
.	RABBITFABL	RIBOFLAVIN	0.340000
.	RABBITFABL	THIAMIN	0.140000
.	RABBITFABL	VITAMIN_A	1101.000000
.	RABBITFAFL	ASCORBIC	1.800000
.	RABBITFAFL	AVAILABLE	0.072410
.	RABBITFAFL	CALCIUM	9.000000
.	RABBITFAFL	COST	219.000000
.	RABBITFAFL	IRON	2.200000
.	RABBITFAFL	KCALORIES	262.380000
.	RABBITFAFL	NIACIN	35.050000
.	RABBITFAFL	PHOSPHORUS	158.000000
.	RABBITFAFL	PROTEIN	19.200000
.	RABBITFAFL	RIBOFLAVIN	0.340000
.	RABBITFAFL	THIAMIN	0.140000
.	RABBITFAFL	VITAMIN_A	1101.000000
.	RABBITFAUP	ASCORBIC	1.800000
.	RABBITFAUP	AVAILABLE	0.262295
.	RABBITFAUP	CALCIUM	9.000000
.	RABBITFAUP	COST	219.000000
.	RABBITFAUP	IRON	2.200000
.	RABBITFAUP	KCALORIES	262.380000
.	RABBITFAUP	NIACIN	35.050000
.	RABBITFAUP	PHOSPHORUS	158.000000
.	RABBITFAUP	PROTEIN	19.200000
.	RABBITFAUP	RIBOFLAVIN	0.340000
.	RABBITFAUP	THIAMIN	0.140000
.	RABBITFAUP	VITAMIN_A	1101.000000
.	RABBITSUBL	ASCORBIC	1.800000
.	RABBITSUBL	AVAILABLE	0.211435
.	RABBITSUBL	CALCIUM	10.000000
.	RABBITSUBL	COST	284.000000
.	RABBITSUBL	IRON	2.500000
.	RABBITSUBL	KCALORIES	169.710000
.	RABBITSUBL	NIACIN	5.760000
.	RABBITSUBL	PHOSPHORUS	180.000000
.	RABBITSUBL	PROTEIN	22.000000
.	RABBITSUBL	RIBOFLAVIN	0.390000
.	RABBITSUBL	THIAMIN	0.160000
.	RABBITSUBL	VITAMIN_A	1101.000000
.	RABBITSUFL	ASCORBIC	1.800000
.	RABBITSUFL	AVAILABLE	0.056090
.	RABBITSUFL	CALCIUM	10.000000
.	RABBITSUFL	COST	284.000000
.	RABBITSUFL	IRON	2.500000
.	RABBITSUFL	KCALORIES	169.710000
.	RABBITSUFL	NIACIN	5.760000
.	RABBITSUFL	PHOSPHORUS	180.000000
.	RABBITSUFL	PROTEIN	22.000000
.	RABBITSUFL	RIBOFLAVIN	0.390000
.	RABBITSUFL	THIAMIN	0.160000
.	RABBITSUFL	VITAMIN_A	1101.000000
.	RABBITSUUP	ASCORBIC	1.800000
.	RABBITSUUP	AVAILABLE	0.203190
.	RABBITSUUP	CALCIUM	10.000000
.	RABBITSUUP	COST	284.000000
.	RABBITSUUP	IRON	2.500000
.	RABBITSUUP	KCALORIES	169.710000
.	RABBITSUUP	NIACIN	5.760000
.	RABBITSUUP	PHOSPHORUS	180.000000

RABBITSUUP	PROTEIN	22.000000
RABBITSUUP	RIBOFLAVIN	0.390000
RABBITSUUP	THIAMIN	0.160000
RABBITSUUP	VITAMIN_A	1101.000000
RABBITWIBL	ASCORBIC	1.800000
RABBITWIBL	AVAILABLE	0.272940
RABBITWIBL	CALCIUM	10.000000
RABBITWIBL	COST	219.000000
RABBITWIBL	IRON	2.400000
RABBITWIBL	KCALORIES	204.700000
RABBITWIBL	NIACIN	5.500000
RABBITWIBL	PHOSPHORUS	172.000000
RABBITWIBL	PROTEIN	20.900000
RABBITWIBL	RIBOFLAVIN	0.370000
RABBITWIBL	THIAMIN	0.150000
RABBITWIBL	VITAMIN_A	1101.000000
RABBITWIFL	ASCORBIC	1.800000
RABBITWIFL	AVAILABLE	0.072410
RABBITWIFL	CALCIUM	10.000000
RABBITWIFL	COST	219.000000
RABBITWIFL	IRON	2.400000
RABBITWIFL	KCALORIES	204.700000
RABBITWIFL	NIACIN	5.500000
RABBITWIFL	PHOSPHORUS	172.000000
RABBITWIFL	PROTEIN	20.900000
RABBITWIFL	RIBOFLAVIN	0.370000
RABBITWIFL	THIAMIN	0.150000
RABBITWIFL	VITAMIN_A	1101.000000
RABBITWIUP	ASCORBIC	1.800000
RABBITWIUP	AVAILABLE	0.262295
RABBITWIUP	CALCIUM	10.000000
RABBITWIUP	COST	219.000000
RABBITWIUP	IRON	2.400000
RABBITWIUP	KCALORIES	204.700000
RABBITWIUP	NIACIN	5.500000
RABBITWIUP	PHOSPHORUS	172.000000
RABBITWIUP	PROTEIN	20.900000
RABBITWIUP	RIBOFLAVIN	0.370000
RABBITWIUP	THIAMIN	0.150000
RABBITWIUP	VITAMIN_A	1101.000000
RACCOOFAFL	ASCORBIC	1.500000
RACCOOFAFL	AVAILABLE	0.150005
RACCOOFAFL	CALCIUM	9.000000
RACCOOFAFL	COST	277.000000
RACCOOFAFL	IRON	2.200000
RACCOOFAFL	KCALORIES	441.370000
RACCOOFAFL	NIACIN	5.050000
RACCOOFAFL	PHOSPHORUS	158.000000
RACCOOFAFL	PROTEIN	13.800000
RACCOOFAFL	RIBOFLAVIN	0.310000
RACCOOFAFL	THIAMIN	0.500000
RACCOOFAFL	VITAMIN_A	826.000000
RACCOOSUFL	ASCORBIC	1.500000
RACCOOSUFL	AVAILABLE	0.094365
RACCOOSUFL	CALCIUM	10.000000
RACCOOSUFL	COST	398.000000
RACCOOSUFL	IRON	2.500000
RACCOOSUFL	KCALORIES	373.670000
RACCOOSUFL	NIACIN	5.810000
RACCOOSUFL	PHOSPHORUS	182.000000
RACCOOSUFL	PROTEIN	15.900000
RACCOOSUFL	RIBOFLAVIN	0.350000
RACCOOSUFL	THIAMIN	0.570000
RACCOOSUFL	VITAMIN_A	826.000000
RACCOOWIFL	ASCORBIC	1.500000
RACCOOWIFL	AVAILABLE	0.120000
RACCOOWIFL	CALCIUM	11.000000
RACCOOWIFL	COST	395.000000
RACCOOWIFL	IRON	2.800000

RACCOOWIFL	KCALORIES	326.430000
RACCOOWIFL	NIACIN	6.310000
RACCOOWIFL	PHOSPHORUS	198.000000
RACCOOWIFL	PROTEIN	17.300000
RACCOOWIFL	RIBOFLAVIN	0.370000
RACCOOWIFL	THIAMIN	0.620000
RACCOOWIFL	VITAMIN_A	826.000000
SNAPPIWIRI	ASCORBIC	2.000000
SNAPPIWIRI	AVAILABLE	0.017960
SNAPPIWIRI	CALCIUM	107.000000
SNAPPIWIRI	COST	179.000000
SNAPPIWIRI	IRON	2.000000
SNAPPIWIRI	KCALORIES	69.270000
SNAPPIWIRI	NIACIN	7.000000
SNAPPIWIRI	PHOSPHORUS	220.000000
SNAPPIWIRI	PROTEIN	15.800000
SNAPPIWIRI	RIBOFLAVIN	0.710000
SNAPPIWIRI	THIAMIN	0.220000
SNAPPIWIRI	VITAMIN_A	19.000000
SQUIRRFABL	ASCORBIC	1.100000
SQUIRRFABL	AVAILABLE	0.213215
SQUIRRFABL	CALCIUM	13.000000
SQUIRRFABL	COST	577.000000
SQUIRRFABL	IRON	1.100000
SQUIRRFABL	KCALORIES	444.170000
SQUIRRFABL	NIACIN	2.320000
SQUIRRFABL	PHOSPHORUS	116.000000
SQUIRRFABL	PROTEIN	15.300000
SQUIRRFABL	RIBOFLAVIN	0.260000
SQUIRRFABL	THIAMIN	0.040000
SQUIRRFABL	VITAMIN_A	1101.000000
SQUIRRFAFL	ASCORBIC	1.100000
SQUIRRFAFL	AVAILABLE	0.056565
SQUIRRFAFL	CALCIUM	13.000000
SQUIRRFAFL	COST	577.000000
SQUIRRFAFL	IRON	1.100000
SQUIRRFAFL	KCALORIES	444.170000
SQUIRRFAFL	NIACIN	2.320000
SQUIRRFAFL	PHOSPHORUS	116.000000
SQUIRRFAFL	PROTEIN	15.300000
SQUIRRFAFL	RIBOFLAVIN	0.260000
SQUIRRFAFL	THIAMIN	0.040000
SQUIRRFAFL	VITAMIN_A	1101.000000
SQUIRRFAUP	ASCORBIC	1.100000
SQUIRRFAUP	AVAILABLE	0.204900
SQUIRRFAUP	CALCIUM	13.000000
SQUIRRFAUP	COST	577.000000
SQUIRRFAUP	IRON	1.100000
SQUIRRFAUP	KCALORIES	444.170000
SQUIRRFAUP	NIACIN	2.320000
SQUIRRFAUP	PHOSPHORUS	116.000000
SQUIRRFAUP	PROTEIN	15.300000
SQUIRRFAUP	RIBOFLAVIN	0.260000
SQUIRRFAUP	THIAMIN	0.040000
SQUIRRFAUP	VITAMIN_A	1101.000000
SQUIRRSUBL	ASCORBIC	1.100000
SQUIRRSUBL	AVAILABLE	0.168230
SQUIRRSUBL	CALCIUM	18.000000
SQUIRRSUBL	COST	1015.000000
SQUIRRSUBL	IRON	1.500000
SQUIRRSUBL	KCALORIES	278.240000
SQUIRRSUBL	NIACIN	3.160000
SQUIRRSUBL	PHOSPHORUS	158.000000
SQUIRRSUBL	PROTEIN	20.800000
SQUIRRSUBL	RIBOFLAVIN	0.380000
SQUIRRSUBL	THIAMIN	0.060000
SQUIRRSUBL	VITAMIN_A	1101.000000
SQUIRRSUFL	ASCORBIC	1.100000
SQUIRRSUFL	AVAILABLE	0.044630

SQUIRRSUFL	CALCIUM	18.000000
SQUIRRSUFL	COST	1015.000000
SQUIRRSUFL	IRON	1.500000
SQUIRRSUFL	KCALORIES	278.240000
SQUIRRSUFL	NIACIN	3.160000
SQUIRRSUFL	PHOSPHORUS	158.000000
SQUIRRSUFL	PROTEIN	20.800000
SQUIRRSUFL	RIBOFLAVIN	0.380000
SQUIRRSUFL	THIAMIN	0.060000
SQUIRRSUFL	VITAMIN_A	1101.000000
SQUIRRSUUP	ASCORBIC	1.100000
SQUIRRSUUP	AVAILABLE	0.161670
SQUIRRSUUP	CALCIUM	18.000000
SQUIRRSUUP	COST	1015.000000
SQUIRRSUUP	IRON	1.500000
SQUIRRSUUP	KCALORIES	278.240000
SQUIRRSUUP	NIACIN	3.160000
SQUIRRSUUP	PHOSPHORUS	158.000000
SQUIRRSUUP	PROTEIN	20.800000
SQUIRRSUUP	RIBOFLAVIN	0.380000
SQUIRRSUUP	THIAMIN	0.060000
SQUIRRSUUP	VITAMIN_A	1101.000000
SQUIRRWIBL	ASCORBIC	1.100000
SQUIRRWIBL	AVAILABLE	0.182340
SQUIRRWIBL	CALCIUM	17.000000
SQUIRRWIBL	COST	634.000000
SQUIRRWIBL	IRON	1.400000
SQUIRRWIBL	KCALORIES	336.260000
SQUIRRWIBL	NIACIN	2.960000
SQUIRRWIBL	PHOSPHORUS	148.000000
SQUIRRWIBL	PROTEIN	19.600000
SQUIRRWIBL	RIBOFLAVIN	0.300000
SQUIRRWIBL	THIAMIN	0.050000
SQUIRRWIBL	VITAMIN_A	1101.000000
SQUIRRWIFL	ASCORBIC	1.100000
SQUIRRWIFL	AVAILABLE	0.048375
SQUIRRWIFL	CALCIUM	17.000000
SQUIRRWIFL	COST	634.000000
SQUIRRWIFL	IRON	1.400000
SQUIRRWIFL	KCALORIES	336.250000
SQUIRRWIFL	NIACIN	2.960000
SQUIRRWIFL	PHOSPHORUS	148.000000
SQUIRRWIFL	PROTEIN	19.600000
SQUIRRWIFL	RIBOFLAVIN	0.300000
SQUIRRWIFL	THIAMIN	0.050000
SQUIRRWIFL	VITAMIN_A	1101.000000
SQUIRRWIUP	ASCORBIC	1.100000
SQUIRRWIUP	AVAILABLE	0.175230
SQUIRRWIUP	CALCIUM	17.000000
SQUIRRWIUP	COST	634.000000
SQUIRRWIUP	IRON	1.400000
SQUIRRWIUP	KCALORIES	336.250000
SQUIRRWIUP	NIACIN	2.960000
SQUIRRWIUP	PHOSPHORUS	148.000000
SQUIRRWIUP	PROTEIN	19.600000
SQUIRRWIUP	RIBOFLAVIN	0.300000
SQUIRRWIUP	THIAMIN	0.050000
SQUIRRWIUP	VITAMIN_A	1101.000000
TUBERFAFL	ASCORBIC	4.000000
TUBERFAFL	AVAILABLE	2.824660
TUBERFAFL	CALCIUM	14.000000
TUBERFAFL	COST	85.000000
TUBERFAFL	IRON	3.400000
TUBERFAFL	KCALORIES	69.900000
TUBERFAFL	NIACIN	1.300000
TUBERFAFL	PHOSPHORUS	78.000000
TUBERFAFL	PROTEIN	2.300000
TUBERFAFL	RIBOFLAVIN	0.060000
TUBERFAFL	THIAMIN	0.200000

TUBERFAFL	VITAMIN_A	20.000000
TUBERSUFL	ASCORBIC	4.000000
TUBERSUFL	AVAILABLE	0.523150
TUBERSUFL	CALCIUM	14.000000
TUBERSUFL	COST	85.000000
TUBERSUFL	IRON	3.400000
TUBERSUFL	KCALORIES	69.900000
TUBERSUFL	NIACIN	1.300000
TUBERSUFL	PHOSPHORUS	78.000000
TUBERSUFL	PROTEIN	2.300000
TUBERSUFL	RIBOFLAVIN	0.060000
TUBERSUFL	THIAMIN	0.200000
TUBERSUFL	VITAMIN_A	20.000000
TUBERWIFL	ASCORBIC	4.000000
TUBERWIFL	AVAILABLE	1.778610
TUBERWIFL	CALCIUM	14.000000
TUBERWIFL	COST	60.000000
TUBERWIFL	IRON	3.400000
TUBERWIFL	KCALORIES	69.900000
TUBERWIFL	NIACIN	1.300000
TUBERWIFL	PHOSPHORUS	78.000000
TUBERWIFL	PROTEIN	2.300000
TUBERWIFL	RIBOFLAVIN	0.060000
TUBERWIFL	THIAMIN	0.200000
TUBERWIFL	VITAMIN_A	20.000000
TURKEYFAFL	ASCORBIC	1.800000
TURKEYFAFL	AVAILABLE	0.116845
TURKEYFAFL	CALCIUM	6.000000
TURKEYFAFL	COST	181.000000
TURKEYFAFL	IRON	1.200000
TURKEYFAFL	KCALORIES	342.850000
TURKEYFAFL	NIACIN	6.120000
TURKEYFAFL	PHOSPHORUS	162.000000
TURKEYFAFL	PROTEIN	18.400000
TURKEYFAFL	RIBOFLAVIN	0.130000
TURKEYFAFL	THIAMIN	0.060000
TURKEYFAFL	VITAMIN_A	531.000000
TURKEYFAUP	ASCORBIC	1.800000
TURKEYFAUP	AVAILABLE	0.423270
TURKEYFAUP	CALCIUM	6.000000
TURKEYFAUP	COST	181.000000
TURKEYFAUP	IRON	1.200000
TURKEYFAUP	KCALORIES	342.850000
TURKEYFAUP	NIACIN	6.120000
TURKEYFAUP	PHOSPHORUS	162.000000
TURKEYFAUP	PROTEIN	18.400000
TURKEYFAUP	RIBOFLAVIN	0.130000
TURKEYFAUP	THIAMIN	0.060000
TURKEYFAUP	VITAMIN_A	531.000000
TURKEYSUFL	ASCORBIC	1.800000
TURKEYSUFL	AVAILABLE	0.070680
TURKEYSUFL	CALCIUM	8.000000
TURKEYSUFL	COST	305.000000
TURKEYSUFL	IRON	1.500000
TURKEYSUFL	KCALORIES	158.310000
TURKEYSUFL	NIACIN	8.160000
TURKEYSUFL	PHOSPHORUS	216.000000
TURKEYSUFL	PROTEIN	24.400000
TURKEYSUFL	RIBOFLAVIN	0.170000
TURKEYSUFL	THIAMIN	0.080000
TURKEYSUFL	VITAMIN_A	531.000000
TURKEYSUUP	ASCORBIC	1.800000
TURKEYSUUP	AVAILABLE	0.256045
TURKEYSUUP	CALCIUM	8.000000
TURKEYSUUP	COST	305.000000
TURKEYSUUP	IRON	1.500000
TURKEYSUUP	KCALORIES	158.310000
TURKEYSUUP	NIACIN	8.160000
TURKEYSUUP	PHOSPHORUS	216.000000

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.     TURKEYSUUP   PROTEIN          24.400000
.     TURKEYSUUP   RIBOFLAVIN        0.170000
.     TURKEYSUUP   THIAMIN           0.080000
.     TURKEYSUUP   VITAMIN_A       531.000000
.     TURKEYWIFL   ASCORBIC          1.800000
.     TURKEYWIFL   AVAILABLE         0.116845
.     TURKEYWIFL   CALCIUM           6.000000
.     TURKEYWIFL   COST            146.000000
.     TURKEYWIFL   IRON              1.200000
.     TURKEYWIFL   KCALORIES       342.850000
.     TURKEYWIFL   NIACIN            6.120000
.     TURKEYWIFL   PHOSPHORUS      162.000000
.     TURKEYWIFL   PROTEIN          18.400000
.     TURKEYWIFL   RIBOFLAVIN        0.130000
.     TURKEYWIFL   THIAMIN           0.060000
.     TURKEYWIFL   VITAMIN_A       531.000000
.     TURKEYWIUP   ASCORBIC          1.800000
.     TURKEYWIUP   AVAILABLE         0.423270
.     TURKEYWIUP   CALCIUM           6.000000
.     TURKEYWIUP   COST            146.000000
.     TURKEYWIUP   IRON              1.200000
.     TURKEYWIUP   KCALORIES       342.850000
.     TURKEYWIUP   NIACIN            6.120000
.     TURKEYWIUP   PHOSPHORUS      162.000000
.     TURKEYWIUP   PROTEIN          18.400000
.     TURKEYWIUP   RIBOFLAVIN        0.130000
.     TURKEYWIUP   THIAMIN           0.060000
.     TURKEYWIUP   VITAMIN_A       531.000000
.     WALNUTFAFL   ASCORBIC          2.000000
.     WALNUTFAFL   AVAILABLE       137.465940
.     WALNUTFAFL   CALCIUM           0.000000
.     WALNUTFAFL   COST            897.000000
.     WALNUTFAFL   IRON              6.000000
.     WALNUTFAFL   KCALORIES       627.720000
.     WALNUTFAFL   NIACIN            0.700000
.     WALNUTFAFL   PHOSPHORUS      570.000000
.     WALNUTFAFL   PROTEIN          20.500000
.     WALNUTFAFL   RIBOFLAVIN        0.110000
.     WALNUTFAFL   THIAMIN           0.220000
.     WALNUTFAFL   VITAMIN_A       300.000000
.     _RHS_        COST                 0
.     _RHS_        KCALORIES         1386
.     _RHS_        PROTEIN            26.46
.     _RHS_        CALCIUM            541.8
.     _RHS_        PHOSPHORUS         541.8
.     _RHS_        IRON                8.19
.     _RHS_        VITAMIN_A          913.5
.     _RHS_        THIAMIN             .567
.     _RHS_        RIBOFLAVIN          .630
.     _RHS_        NIACIN             7.56
.     _RHS_        ASCORBIC           18.9
PROC LP SPARSEDATA RANGEPRICE;
RUN;
/*
```

```
//R137GFAL JOB (,,5,1),PRENTICE,CLASS=2,
//       USER=POTTERY,PASSWORD=
/*ROUTE PRINT NER.R0
// EXEC SAS
DATA;
  INPUT _TYPE_ $ @10 _COL_ $13. @24 _ROW_ $16. _COEF_;
  CARDS;
MIN     .             COST              .
GE      .             KCALORIES         .
GE      .             PROTEIN           .
GE      .             CALCIUM           .
GE      .             PHOSPHORUS        .
GE      .             IRON              .
GE      .             VITAMIN_A         .
GE      .             THIAMIN           .
GE      .             RIBOFLAVIN        .
GE      .             NIACIN            .
GE      .             ASCORBIC          .
UPPERBD .             AVAILABLE         .
.       BEARFABL      ASCORBIC          1.300000
.       BEARFABL      AVAILABLE         0.166295
.       BEARFABL      CALCIUM           9.000000
.       BEARFABL      COST              328.000000
.       BEARFABL      IRON              2.200000
.       BEARFABL      KCALORIES         334.170000
.       BEARFABL      NIACIN            5.050000
.       BEARFABL      PHOSPHORUS        158.000000
.       BEARFABL      PROTEIN           17.000000
.       BEARFABL      RIBOFLAVIN        0.340000
.       BEARFABL      THIAMIN           0.620000
.       BEARFABL      VITAMIN_A         551.000000
.       BEARFAFL      ASCORBIC          1.300000
.       BEARFAFL      AVAILABLE         0.044115
.       BEARFAFL      CALCIUM           9.000000
.       BEARFAFL      COST              328.000000
.       BEARFAFL      IRON              2.200000
.       BEARFAFL      KCALORIES         334.170000
.       BEARFAFL      NIACIN            5.050000
.       BEARFAFL      PHOSPHORUS        158.000000
.       BEARFAFL      PROTEIN           17.000000
.       BEARFAFL      RIBOFLAVIN        0.340000
.       BEARFAFL      THIAMIN           0.620000
.       BEARFAFL      VITAMIN_A         551.000000
.       BEARFAUP      ASCORBIC          1.300000
.       BEARFAUP      AVAILABLE         0.159810
.       BEARFAUP      CALCIUM           9.000000
.       BEARFAUP      COST              328.000000
.       BEARFAUP      IRON              2.200000
.       BEARFAUP      KCALORIES         334.170000
.       BEARFAUP      NIACIN            5.050000
.       BEARFAUP      PHOSPHORUS        158.000000
.       BEARFAUP      PROTEIN           17.000000
.       BEARFAUP      RIBOFLAVIN        0.340000
.       BEARFAUP      THIAMIN           0.620000
.       BEARFAUP      VITAMIN_A         551.000000
.       BEARSPBL      ASCORBIC          1.300000
.       BEARSPBL      AVAILABLE         0.124290
.       BEARSPBL      CALCIUM           12.000000
.       BEARSPBL      COST              475.000000
.       BEARSPBL      IRON              3.000000
.       BEARSPBL      KCALORIES         134.290000
.       BEARSPBL      NIACIN            6.820000
.       BEARSPBL      PHOSPHORUS        213.000000
.       BEARSPBL      PROTEIN           23.000000
.       BEARSPBL      RIBOFLAVIN        0.470000
.       BEARSPBL      THIAMIN           0.850000
.       BEARSPBL      VITAMIN_A         551.000000
.       BEARSPFL      ASCORBIC          1.300000
.       BEARSPFL      AVAILABLE         0.032975
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.	BEARSPFL	CALCIUM	12.000000
.	BEARSPFL	COST	475.000000
.	BEARSPFL	IRON	3.000000
.	BEARSPFL	KCALORIES	134.290000
.	BEARSPFL	NIACIN	6.820000
.	BEARSPFL	PHOSPHORUS	213.000000
.	BEARSPFL	PROTEIN	23.000000
.	BEARSPFL	RIBOFLAVIN	0.470000
.	BEARSPFL	THIAMIN	0.850000
.	BEARSPFL	VITAMIN_A	551.000000
.	BEARSPUP	ASCORBIC	1.300000
.	BEARSPUP	AVAILABLE	0.119445
.	BEARSPUP	CALCIUM	12.000000
.	BEARSPUP	COST	475.000000
.	BEARSPUP	IRON	3.000000
.	BEARSPUP	KCALORIES	134.290000
.	BEARSPUP	NIACIN	6.820000
.	BEARSPUP	PHOSPHORUS	213.000000
.	BEARSPUP	PROTEIN	23.000000
.	BEARSPUP	RIBOFLAVIN	0.470000
.	BEARSPUP	THIAMIN	0.850000
.	BEARSPUP	VITAMIN_A	551.000000
.	BEARSUBL	ASCORBIC	1.300000
.	BEARSUBL	AVAILABLE	0.131300
.	BEARSUBL	CALCIUM	11.000000
.	BEARSUBL	COST	431.000000
.	BEARSUBL	IRON	2.600000
.	BEARSUBL	KCALORIES	214.240000
.	BEARSUBL	NIACIN	6.060000
.	BEARSUBL	PHOSPHORUS	190.000000
.	BEARSUBL	PROTEIN	20.600000
.	BEARSUBL	RIBOFLAVIN	0.420000
.	BEARSUBL	THIAMIN	0.760000
.	BEARSUBL	VITAMIN_A	551.000000
.	BEARSUFL	ASCORBIC	1.300000
.	BEARSUFL	AVAILABLE	0.034830
.	BEARSUFL	CALCIUM	11.000000
.	BEARSUFL	COST	431.000000
.	BEARSUFL	IRON	2.600000
.	BEARSUFL	KCALORIES	214.240000
.	BEARSUFL	NIACIN	6.060000
.	BEARSUFL	PHOSPHORUS	190.000000
.	BEARSUFL	PROTEIN	20.600000
.	BEARSUFL	RIBOFLAVIN	0.420000
.	BEARSUFL	THIAMIN	0.760000
.	BEARSUFL	VITAMIN_A	551.000000
.	BEARSUUP	ASCORBIC	1.300000
.	BEARSUUP	AVAILABLE	0.126180
.	BEARSUUP	CALCIUM	11.000000
.	BEARSUUP	COST	431.000000
.	BEARSUUP	IRON	2.600000
.	BEARSUUP	KCALORIES	214.240000
.	BEARSUUP	NIACIN	6.060000
.	BEARSUUP	PHOSPHORUS	190.000000
.	BEARSUUP	PROTEIN	20.600000
.	BEARSUUP	RIBOFLAVIN	0.420000
.	BEARSUUP	THIAMIN	0.760000
.	BEARSUUP	VITAMIN_A	551.000000
.	BEAVERFARI	ASCORBIC	1.800000
.	BEAVERFARI	AVAILABLE	0.008570
.	BEAVERFARI	CALCIUM	9.000000
.	BEAVERFARI	COST	170.000000
.	BEAVERFARI	IRON	2.200000
.	BEAVERFARI	KCALORIES	200.100000
.	BEAVERFARI	NIACIN	5.050000
.	BEAVERFARI	PHOSPHORUS	158.000000
.	BEAVERFARI	PROTEIN	21.300000
.	BEAVERFARI	RIBOFLAVIN	0.390000
.	BEAVERFARI	THIAMIN	0.100000

.	BEAVERFARI	VITAMIN_A	1101.000000
.	BEAVERSPRI	ASCORBIC	1.800000
.	BEAVERSPRI	AVAILABLE	0.008570
.	BEAVERSPRI	CALCIUM	9.000000
.	BEAVERSPRI	COST	205.000000
.	BEAVERSPRI	IRON	2.200000
.	BEAVERSPRI	KCALORIES	200.100000
.	BEAVERSPRI	NIACIN	5.050000
.	BEAVERSPRI	PHOSPHORUS	158.000000
.	BEAVERSPRI	PROTEIN	21.300000
.	BEAVERSPRI	RIBOFLAVIN	0.390000
.	BEAVERSPRI	THIAMIN	0.100000
.	BEAVERSPRI	VITAMIN_A	1101.000000
.	BEAVERSURI	ASCORBIC	1.800000
.	BEAVERSURI	AVAILABLE	0.008570
.	BEAVERSURI	CALCIUM	9.000000
.	BEAVERSURI	COST	205.000000
.	BEAVERSURI	IRON	2.200000
.	BEAVERSURI	KCALORIES	200.100000
.	BEAVERSURI	NIACIN	5.050000
.	BEAVERSURI	PHOSPHORUS	158.000000
.	BEAVERSURI	PROTEIN	21.300000
.	BEAVERSURI	RIBOFLAVIN	0.390000
.	BEAVERSURI	THIAMIN	0.100000
.	BEAVERSURI	VITAMIN_A	1101.000000
.	BERRIESUFL	ASCORBIC	21.000000
.	BERRIESUFL	AVAILABLE	0.072200
.	BERRIESUFL	CALCIUM	32.000000
.	BERRIESUFL	COST	81.000000
.	BERRIESUFL	IRON	0.900000
.	BERRIESUFL	KCALORIES	58.000000
.	BERRIESUFL	NIACIN	0.400000
.	BERRIESUFL	PHOSPHORUS	10.000000
.	BERRIESUFL	PROTEIN	1.200000
.	BERRIESUFL	RIBOFLAVIN	0.040000
.	BERRIESUFL	THIAMIN	0.030000
.	BERRIESUFL	VITAMIN_A	200.000000
.	BLACKCSUFL	ASCORBIC	10.000000
.	BLACKCSUFL	AVAILABLE	72.198500
.	BLACKCSUFL	CALCIUM	22.000000
.	BLACKCSUFL	COST	74.000000
.	BLACKCSUFL	IRON	0.400000
.	BLACKCSUFL	KCALORIES	69.520000
.	BLACKCSUFL	NIACIN	0.400000
.	BLACKCSUFL	PHOSPHORUS	19.000000
.	BLACKCSUFL	PROTEIN	1.300000
.	BLACKCSUFL	RIBOFLAVIN	0.060000
.	BLACKCSUFL	THIAMIN	0.060000
.	BLACKCSUFL	VITAMIN_A	110.000000
.	BLUEBESUBL	ASCORBIC	21.100000
.	BLUEBESUBL	AVAILABLE	0.272150
.	BLUEBESUBL	CALCIUM	23.000000
.	BLUEBESUBL	COST	81.000000
.	BLUEBESUBL	IRON	1.600000
.	BLUEBESUBL	KCALORIES	95.120000
.	BLUEBESUBL	NIACIN	0.740000
.	BLUEBESUBL	PHOSPHORUS	20.000000
.	BLUEBESUBL	PROTEIN	1.060000
.	BLUEBESUBL	RIBOFLAVIN	0.100000
.	BLUEBESUBL	THIAMIN	0.040000
.	BLUEBESUBL	VITAMIN_A	158.500000
.	BOXTURFABL	ASCORBIC	1.700000
.	BOXTURFABL	AVAILABLE	0.448140
.	BOXTURFABL	CALCIUM	107.000000
.	BOXTURFABL	COST	600.000000
.	BOXTURFABL	IRON	3.200000
.	BOXTURFABL	KCALORIES	110.990000
.	BOXTURFABL	NIACIN	4.800000
.	BOXTURFABL	PHOSPHORUS	183.000000

.	BOXTURFABL	PROTEIN	18.200000
.	BOXTURFABL	RIBOFLAVIN	0.690000
.	BOXTURFABL	THIAMIN	0.240000
.	BOXTURFABL	VITAMIN_A	1662.000000
.	BOXTURFAFL	ASCORBIC	1.700000
.	BOXTURFAFL	AVAILABLE	0.118887
.	BOXTURFAFL	CALCIUM	107.000000
.	BOXTURFAFL	COST	600.000000
.	BOXTURFAFL	IRON	3.200000
.	BOXTURFAFL	KCALORIES	110.990000
.	BOXTURFAFL	NIACIN	4.800000
.	BOXTURFAFL	PHOSPHORUS	183.000000
.	BOXTURFAFL	PROTEIN	18.200000
.	BOXTURFAFL	RIBOFLAVIN	0.690000
.	BOXTURFAFL	THIAMIN	0.240000
.	BOXTURFAFL	VITAMIN_A	1652.000000
.	BOXTURFAUP	ASCORBIC	1.700000
.	BOXTURFAUP	AVAILABLE	0.430667
.	BOXTURFAUP	CALCIUM	107.000000
.	BOXTURFAUP	COST	600.000000
.	BOXTURFAUP	IRON	3.200000
.	BOXTURFAUP	KCALORIES	110.990000
.	BOXTURFAUP	NIACIN	4.800000
.	BOXTURFAUP	PHOSPHORUS	183.000000
.	BOXTURFAUP	PROTEIN	18.200000
.	BOXTURFAUP	RIBOFLAVIN	0.690000
.	BOXTURFAUP	THIAMIN	0.240000
.	BOXTURFAUP	VITAMIN_A	1652.000000
.	C_PODSFAFL	ASCORBIC	0.000000
.	C_PODSFAFL	AVAILABLE	577.790160
.	C_PODSFAFL	CALCIUM	128.000000
.	C_PODSFAFL	COST	153.000000
.	C_PODSFAFL	IRON	12.800000
.	C_PODSFAFL	KCALORIES	362.690000
.	C_PODSFAFL	NIACIN	1.470000
.	C_PODSFAFL	PHOSPHORUS	442.000000
.	C_PODSFAFL	PROTEIN	12.600000
.	C_PODSFAFL	RIBOFLAVIN	6.430000
.	C_PODSFAFL	THIAMIN	0.650000
.	C_PODSFAFL	VITAMIN_A	20.000000
.	DEERFAUP	ASCORBIC	1.500000
.	DEERFAUP	AVAILABLE	1.767090
.	DEERFAUP	CALCIUM	8.000000
.	DEERFAUP	COST	83.000000
.	DEERFAUP	IRON	2.200000
.	DEERFAUP	KCALORIES	255.550000
.	DEERFAUP	NIACIN	5.290000
.	DEERFAUP	PHOSPHORUS	209.000000
.	DEERFAUP	PROTEIN	17.600000
.	DEERFAUP	RIBOFLAVIN	0.430000
.	DEERFAUP	THIAMIN	0.200000
.	DEERFAUP	VITAMIN_A	826.000000
.	DEERSPFL	ASCORBIC	0.000000
.	DEERSPFL	AVAILABLE	0.406635
.	DEERSPFL	CALCIUM	10.000000
.	DEERSPFL	COST	132.000000
.	DEERSPFL	IRON	2.600000
.	DEERSPFL	KCALORIES	125.750000
.	DEERSPFL	NIACIN	6.300000
.	DEERSPFL	PHOSPHORUS	249.000000
.	DEERSPFL	PROTEIN	21.000000
.	DEERSPFL	RIBOFLAVIN	0.510000
.	DEERSPFL	THIAMIN	0.230000
.	DEERSPFL	VITAMIN_A	826.000000
.	DEERSUFL	ASCORBIC	1.500000
.	DEERSUFL	AVAILABLE	0.412020
.	DEERSUFL	CALCIUM	10.000000
.	DEERSUFL	COST	111.000000
.	DEERSUFL	IRON	2.600000

.	DEERSUFL	KCALORIES	138.430000
.	DEERSUFL	NIACIN	6.240000
.	DEERSUFL	PHOSPHORUS	246.000000
.	DEERSUFL	PROTEIN	20.800000
.	DEERSUFL	RIBOFLAVIN	0.510000
.	DEERSUFL	THIAMIN	0.230000
.	DEERSUFL	VITAMIN_A	826.000000
.	DUCKFARI	ASCORBIC	2.100000
.	DUCKFARI	AVAILABLE	0.177620
.	DUCKFARI	CALCIUM	10.000000
.	DUCKFARI	COST	4178.000000
.	DUCKFARI	IRON	1.600000
.	DUCKFARI	KCALORIES	254.260000
.	DUCKFARI	NIACIN	6.700000
.	DUCKFARI	PHOSPHORUS	176.000000
.	DUCKFARI	PROTEIN	20.200000
.	DUCKFARI	RIBOFLAVIN	0.290000
.	DUCKFARI	THIAMIN	0.080000
.	DUCKFARI	VITAMIN_A	1377.000000
.	FISHFARI	ASCORBIC	3.000000
.	FISHFARI	AVAILABLE	30.710150
.	FISHFARI	CALCIUM	15.000000
.	FISHFARI	COST	28.000000
.	FISHFARI	IRON	1.500000
.	FISHFARI	KCALORIES	153.620000
.	FISHFARI	NIACIN	3.000000
.	FISHFARI	PHOSPHORUS	200.000000
.	FISHFARI	PROTEIN	17.600000
.	FISHFARI	RIBOFLAVIN	0.120000
.	FISHFARI	THIAMIN	0.050000
.	FISHFARI	VITAMIN_A	21.000000
.	FISHSPRI	ASCORBIC	3.000000
.	FISHSPRI	AVAILABLE	30.710150
.	FISHSPRI	CALCIUM	15.000000
.	FISHSPRI	COST	89.000000
.	FISHSPRI	IRON	1.500000
.	FISHSPRI	KCALORIES	153.620000
.	FISHSPRI	NIACIN	3.000000
.	FISHSPRI	PHOSPHORUS	200.000000
.	FISHSPRI	PROTEIN	17.600000
.	FISHSPRI	RIBOFLAVIN	0.120000
.	FISHSPRI	THIAMIN	0.050000
.	FISHSPRI	VITAMIN_A	21.000000
.	FISHSURI	ASCORBIC	3.000000
.	FISHSURI	AVAILABLE	30.710150
.	FISHSURI	CALCIUM	15.000000
.	FISHSURI	COST	63.000000
.	FISHSURI	IRON	1.500000
.	FISHSURI	KCALORIES	153.620000
.	FISHSURI	NIACIN	3.000000
.	FISHSURI	PHOSPHORUS	200.000000
.	FISHSURI	PROTEIN	17.600000
.	FISHSURI	RIBOFLAVIN	0.120000
.	FISHSURI	THIAMIN	0.050000
.	FISHSURI	VITAMIN_A	21.000000
.	GRAPESUFL	ASCORBIC	4.000000
.	GRAPESUFL	AVAILABLE	0.463730
.	GRAPESUFL	CALCIUM	16.000000
.	GRAPESUFL	COST	46.000000
.	GRAPESUFL	IRON	0.100000
.	GRAPESUFL	KCALORIES	69.260000
.	GRAPESUFL	NIACIN	0.300000
.	GRAPESUFL	PHOSPHORUS	12.000000
.	GRAPESUFL	PROTEIN	1.300000
.	GRAPESUFL	RIBOFLAVIN	0.030000
.	GRAPESUFL	THIAMIN	0.050000
.	GRAPESUFL	VITAMIN_A	100.000000
.	HAWTHOFAFL	ASCORBIC	22.300000
.	HAWTHOFAFL	AVAILABLE	0.072200

.	HAWTHOFAFL	CALCIUM	85.000000
.	HAWTHOFAFL	COST	65.000000
.	HAWTHOFAFL	IRON	2.100000
.	HAWTHOFAFL	KCALORIES	92.000000
.	HAWTHOFAFL	NIACIN	0.430000
.	HAWTHOFAFL	PHOSPHORUS	25.000000
.	HAWTHOFAFL	PROTEIN	0.400000
.	HAWTHOFAFL	RIBOFLAVIN	0.050000
.	HAWTHOFAFL	THIAMIN	0.050000
.	HAWTHOFAFL	VITAMIN_A	303.000000
.	HAZELNFAFL	ASCORBIC	0.000000
.	HAZELNFAFL	AVAILABLE	0.243020
.	HAZELNFAFL	CALCIUM	209.000000
.	HAZELNFAFL	COST	1277.000000
.	HAZELNFAFL	IRON	3.400000
.	HAZELNFAFL	KCALORIES	633.980000
.	HAZELNFAFL	NIACIN	0.900000
.	HAZELNFAFL	PHOSPHORUS	337.000000
.	HAZELNFAFL	PROTEIN	12.600000
.	HAZELNFAFL	RIBOFLAVIN	0.410000
.	HAZELNFAFL	THIAMIN	0.460000
.	HAZELNFAFL	VITAMIN_A	25.000000
.	HICKORFAUP	ASCORBIC	0.000000
.	HICKORFAUP	AVAILABLE	69.030210
.	HICKORFAUP	CALCIUM	0.000000
.	HICKORFAUP	COST	247.000000
.	HICKORFAUP	IRON	2.400000
.	HICKORFAUP	KCALORIES	672.920000
.	HICKORFAUP	NIACIN	0.800000
.	HICKORFAUP	PHOSPHORUS	360.000000
.	HICKORFAUP	PROTEIN	13.200000
.	HICKORFAUP	RIBOFLAVIN	0.110000
.	HICKORFAUP	THIAMIN	0.340000
.	HICKORFAUP	VITAMIN_A	150.000000
.	MUSKRAFARI	ASCORBIC	1.500000
.	MUSKRAFARI	AVAILABLE	0.472240
.	MUSKRAFARI	CALCIUM	9.000000
.	MUSKRAFARI	COST	480.000000
.	MUSKRAFARI	IRON	2.200000
.	MUSKRAFARI	KCALORIES	117.440000
.	MUSKRAFARI	NIACIN	5.040000
.	MUSKRAFARI	PHOSPHORUS	158.000000
.	MUSKRAFARI	PROTEIN	19.900000
.	MUSKRAFARI	RIBOFLAVIN	0.200000
.	MUSKRAFARI	THIAMIN	0.210000
.	MUSKRAFARI	VITAMIN_A	826.000000
.	MUSKRASPRI	ASCORBIC	1.500000
.	MUSKRASPRI	AVAILABLE	0.472240
.	MUSKRASPRI	CALCIUM	9.000000
.	MUSKRASPRI	COST	543.000000
.	MUSKRASPRI	IRON	2.200000
.	MUSKRASPRI	KCALORIES	117.440000
.	MUSKRASPRI	NIACIN	5.040000
.	MUSKRASPRI	PHOSPHORUS	158.000000
.	MUSKRASPRI	PROTEIN	19.900000
.	MUSKRASPRI	RIBOFLAVIN	0.200000
.	MUSKRASPRI	THIAMIN	0.210000
.	MUSKRASPRI	VITAMIN_A	826.000000
.	MUSKRASURI	ASCORBIC	1.500000
.	MUSKRASURI	AVAILABLE	0.472240
.	MUSKRASURI	CALCIUM	9.000000
.	MUSKRASURI	COST	543.000000
.	MUSKRASURI	IRON	2.200000
.	MUSKRASURI	KCALORIES	117.440000
.	MUSKRASURI	NIACIN	5.040000
.	MUSKRASURI	PHOSPHORUS	158.000000
.	MUSKRASURI	PROTEIN	19.900000
.	MUSKRASURI	RIBOFLAVIN	0.200000
.	MUSKRASURI	THIAMIN	0.210000

MUSKRASURI	VITAMIN_A	826.000000
MUSSELFARI	ASCORBIC	0.300000
MUSSELFARI	AVAILABLE	116.984290
MUSSELFARI	CALCIUM	772.900000
MUSSELFARI	COST	40.000000
MUSSELFARI	IRON	20.160000
MUSSELFARI	KCALORIES	51.800000
MUSSELFARI	NIACIN	1.450000
MUSSELFARI	PHOSPHORUS	431.800000
MUSSELFARI	PROTEIN	7.340000
MUSSELFARI	RIBOFLAVIN	0.250000
MUSSELFARI	THIAMIN	0.000000
MUSSELFARI	VITAMIN_A	17.000000
OPOSSUFAFL	ASCORBIC	1.800000
OPOSSUFAFL	AVAILABLE	0.055730
OPOSSUFAFL	CALCIUM	9.000000
OPOSSUFAFL	COST	184.000000
OPOSSUFAFL	IRON	2.200000
OPOSSUFAFL	KCALORIES	262.380000
OPOSSUFAFL	NIACIN	35.060000
OPOSSUFAFL	PHOSPHORUS	158.000000
OPOSSUFAFL	PROTEIN	19.200000
OPOSSUFAFL	RIBOFLAVIN	0.340000
OPOSSUFAFL	THIAMIN	0.140000
OPOSSUFAFL	VITAMIN_A	1101.000000
OPOSSUSPFL	ASCORBIC	1.800000
OPOSSUSPFL	AVAILABLE	0.055730
OPOSSUSPFL	CALCIUM	11.000000
OPOSSUSPFL	COST	304.000000
OPOSSUSPFL	IRON	2.600000
OPOSSUSPFL	KCALORIES	134.290000
OPOSSUSPFL	NIACIN	6.060000
OPOSSUSPFL	PHOSPHORUS	190.000000
OPOSSUSPFL	PROTEIN	23.000000
OPOSSUSPFL	RIBOFLAVIN	0.400000
OPOSSUSPFL	THIAMIN	0.000000
OPOSSUSPFL	VITAMIN_A	1101.000000
OPOSSUSUFL	ASCORBIC	1.800000
OPOSSUSUFL	AVAILABLE	0.055730
OPOSSUSUFL	CALCIUM	10.000000
OPOSSUSUFL	COST	284.000000
OPOSSUSUFL	IRON	2.500000
OPOSSUSUFL	KCALORIES	169.710000
OPOSSUSUFL	NIACIN	5.760000
OPOSSUSUFL	PHOSPHORUS	180.000000
OPOSSUSUFL	PROTEIN	22.000000
OPOSSUSUFL	RIBOFLAVIN	0.390000
OPOSSUSUFL	THIAMIN	0.160000
OPOSSUSUFL	VITAMIN_A	1101.000000
PAWPAWFABL	ASCORBIC	10.000000
PAWPAWFABL	AVAILABLE	0.381010
PAWPAWFABL	CALCIUM	8.000000
PAWPAWFABL	COST	12.000000
PAWPAWFABL	IRON	0.700000
PAWPAWFABL	KCALORIES	85.840000
PAWPAWFABL	NIACIN	0.700000
PAWPAWFABL	PHOSPHORUS	26.000000
PAWPAWFABL	PROTEIN	5.200000
PAWPAWFABL	RIBOFLAVIN	0.060000
PAWPAWFABL	THIAMIN	0.050000
PAWPAWFABL	VITAMIN_A	190.000000
PLUMFAFL	ASCORBIC	4.000000
PLUMFAFL	AVAILABLE	1.010780
PLUMFAFL	CALCIUM	12.000000
PLUMFAFL	COST	28.000000
PLUMFAFL	IRON	0.500000
PLUMFAFL	KCALORIES	75.280000
PLUMFAFL	NIACIN	0.500000
PLUMFAFL	PHOSPHORUS	18.000000

PLUMFAFL	PROTEIN	0.800000
PLUMFAFL	RIBOFLAVIN	0.030000
PLUMFAFL	THIAMIN	0.030000
PLUMFAFL	VITAMIN_A	300.000000
RABBITFABL	ASCORBIC	1.800000
RABBITFABL	AVAILABLE	0.272940
RABBITFABL	CALCIUM	9.000000
RABBITFABL	COST	184.000000
RABBITFABL	IRON	2.200000
RABBITFABL	KCALORIES	262.380000
RABBITFABL	NIACIN	35.050000
RABBITFABL	PHOSPHORUS	158.000000
RABBITFABL	PROTEIN	19.200000
RABBITFABL	RIBOFLAVIN	0.340000
RABBITFABL	THIAMIN	0.140000
RABBITFABL	VITAMIN_A	1101.000000
RABBITFAFL	ASCORBIC	1.800000
RABBITFAFL	AVAILABLE	0.072410
RABBITFAFL	CALCIUM	9.000000
RABBITFAFL	COST	184.000000
RABBITFAFL	IRON	2.200000
RABBITFAFL	KCALORIES	262.380000
RABBITFAFL	NIACIN	35.050000
RABBITFAFL	PHOSPHORUS	158.000000
RABBITFAFL	PROTEIN	19.200000
RABBITFAFL	RIBOFLAVIN	0.340000
RABBITFAFL	THIAMIN	0.140000
RABBITFAFL	VITAMIN_A	1101.000000
RABBITFAUP	ASCORBIC	1.800000
RABBITFAUP	AVAILABLE	0.262295
RABBITFAUP	CALCIUM	9.000000
RABBITFAUP	COST	184.000000
RABBITFAUP	IRON	2.200000
RABBITFAUP	KCALORIES	262.380000
RABBITFAUP	NIACIN	35.050000
RABBITFAUP	PHOSPHORUS	158.000000
RABBITFAUP	PROTEIN	19.200000
RABBITFAUP	RIBOFLAVIN	0.340000
RABBITFAUP	THIAMIN	0.140000
RABBITFAUP	VITAMIN_A	1101.000000
RABBITSPBL	ASCORBIC	1.800000
RABBITSPBL	AVAILABLE	0.211435
RABBITSPBL	CALCIUM	11.000000
RABBITSPBL	COST	304.000000
RABBITSPBL	IRON	2.600000
RABBITSPBL	KCALORIES	134.290000
RABBITSPBL	NIACIN	6.060000
RABBITSPBL	PHOSPHORUS	190.000000
RABBITSPBL	PROTEIN	23.000000
RABBITSPBL	RIBOFLAVIN	0.400000
RABBITSPBL	THIAMIN	0.000000
RABBITSPBL	VITAMIN_A	1101.000000
RABBITSPFL	ASCORBIC	1.800000
RABBITSPFL	AVAILABLE	0.056090
RABBITSPFL	CALCIUM	11.000000
RABBITSPFL	COST	304.000000
RABBITSPFL	IRON	2.600000
RABBITSPFL	KCALORIES	134.290000
RABBITSPFL	NIACIN	6.060000
RABBITSPFL	PHOSPHORUS	190.000000
RABBITSPFL	PROTEIN	23.000000
RABBITSPFL	RIBOFLAVIN	0.400000
RABBITSPFL	THIAMIN	0.000000
RABBITSPFL	VITAMIN_A	1101.000000
RABBITSPUP	ASCORBIC	1.800000
RABBITSPUP	AVAILABLE	0.203190
RABBITSPUP	CALCIUM	11.000000
RABBITSPUP	COST	304.000000
RABBITSPUP	IRON	2.600000

RABBITSPUP	KCALORIES	134.290000
RABBITSPUP	NIACIN	6.060000
RABBITSPUP	PHOSPHORUS	190.000000
RABBITSPUP	PROTEIN	23.000000
RABBITSPUP	RIBOFLAVIN	0.400000
RABBITSPUP	THIAMIN	0.000000
RABBITSPUP	VITAMIN_A	1101.000000
RABBITSUBL	ASCORBIC	1.800000
RABBITSUBL	AVAILABLE	0.211435
RABBITSUBL	CALCIUM	10.000000
RABBITSUBL	COST	284.000000
RABBITSUBL	IRON	2.500000
RABBITSUBL	KCALORIES	169.710000
RABBITSUBL	NIACIN	5.760000
RABBITSUBL	PHOSPHORUS	180.000000
RABBITSUBL	PROTEIN	22.000000
RABBITSUBL	RIBOFLAVIN	0.390000
RABBITSUBL	THIAMIN	0.160000
RABBITSUBL	VITAMIN_A	1101.000000
RABBITSUFL	ASCORBIC	1.800000
RABBITSUFL	AVAILABLE	0.056090
RABBITSUFL	CALCIUM	10.000000
RABBITSUFL	COST	284.000000
RABBITSUFL	IRON	2.500000
RABBITSUFL	KCALORIES	169.710000
RABBITSUFL	NIACIN	5.760000
RABBITSUFL	PHOSPHORUS	180.000000
RABBITSUFL	PROTEIN	22.000000
RABBITSUFL	RIBOFLAVIN	0.390000
RABBITSUFL	THIAMIN	0.160000
RABBITSUFL	VITAMIN_A	1101.000000
RABBITSUUP	ASCORBIC	1.800000
RABBITSUUP	AVAILABLE	0.203190
RABBITSUUP	CALCIUM	10.000000
RABBITSUUP	COST	284.000000
RABBITSUUP	IRON	2.500000
RABBITSUUP	KCALORIES	169.710000
RABBITSUUP	NIACIN	5.760000
RABBITSUUP	PHOSPHORUS	180.000000
RABBITSUUP	PROTEIN	22.000000
RABBITSUUP	RIBOFLAVIN	0.390000
RABBITSUUP	THIAMIN	0.160000
RABBITSUUP	VITAMIN_A	1101.000000
RACCOOFAFL	ASCORBIC	1.500000
RACCOOFAFL	AVAILABLE	0.150005
RACCOOFAFL	CALCIUM	9.000000
RACCOOFAFL	COST	242.000000
RACCOOFAFL	IRON	2.200000
RACCOOFAFL	KCALORIES	441.370000
RACCOOFAFL	NIACIN	5.050000
RACCOOFAFL	PHOSPHORUS	158.000000
RACCOOFAFL	PROTEIN	13.800000
RACCOOFAFL	RIBOFLAVIN	0.310000
RACCOOFAFL	THIAMIN	0.500000
RACCOOFAFL	VITAMIN_A	826.000000
RACCOOSPFL	ASCORBIC	1.500000
RACCOOSPFL	AVAILABLE	0.090005
RACCOOSPFL	CALCIUM	9.000000
RACCOOSPFL	COST	430.000000
RACCOOSPFL	IRON	3.700000
RACCOOSPFL	KCALORIES	134.290000
RACCOOSPFL	NIACIN	8.430000
RACCOOSPFL	PHOSPHORUS	264.000000
RACCOOSPFL	PROTEIN	23.000000
RACCOOSPFL	RIBOFLAVIN	0.490000
RACCOOSPFL	THIAMIN	0.830000
RACCOOSPFL	VITAMIN_A	826.000000
RACCOOSUFL	ASCORBIC	1.500000
RACCOOSUFL	AVAILABLE	0.094365

RACCOOSUFL	CALCIUM	10.000000
RACCOOSUFL	COST	398.000000
RACCOOSUFL	IRON	2.500000
RACCOOSUFL	KCALORIES	373.670000
RACCOOSUFL	NIACIN	5.810000
RACCOOSUFL	PHOSPHORUS	182.000000
RACCOOSUFL	PROTEIN	15.900000
RACCOOSUFL	RIBOFLAVIN	0.350000
RACCOOSUFL	THIAMIN	0.570000
RACCOOSUFL	VITAMIN_A	826.000000
SNAPPIFARI	ASCORBIC	2.000000
SNAPPIFARI	AVAILABLE	0.017960
SNAPPIFARI	CALCIUM	107.000000
SNAPPIFARI	COST	179.000000
SNAPPIFARI	IRON	2.000000
SNAPPIFARI	KCALORIES	69.270000
SNAPPIFARI	NIACIN	7.000000
SNAPPIFARI	PHOSPHORUS	220.000000
SNAPPIFARI	PROTEIN	15.800000
SNAPPIFARI	RIBOFLAVIN	0.710000
SNAPPIFARI	THIAMIN	0.220000
SNAPPIFARI	VITAMIN_A	19.000000
SOFTSHFARI	ASCORBIC	1.700000
SOFTSHFARI	AVAILABLE	0.015925
SOFTSHFARI	CALCIUM	107.000000
SOFTSHFARI	COST	274.000000
SOFTSHFARI	IRON	1.500000
SOFTSHFARI	KCALORIES	81.940000
SOFTSHFARI	NIACIN	2.600000
SOFTSHFARI	PHOSPHORUS	146.000000
SOFTSHFARI	PROTEIN	17.500000
SOFTSHFARI	RIBOFLAVIN	0.710000
SOFTSHFARI	THIAMIN	0.250000
SOFTSHFARI	VITAMIN_A	1652.000000
SQUIRRFABL	ASCORBIC	1.100000
SQUIRRFABL	AVAILABLE	0.213215
SQUIRRFABL	CALCIUM	13.000000
SQUIRRFABL	COST	542.000000
SQUIRRFABL	IRON	1.100000
SQUIRRFABL	KCALORIES	444.170000
SQUIRRFABL	NIACIN	2.320000
SQUIRRFABL	PHOSPHORUS	116.000000
SQUIRRFABL	PROTEIN	15.300000
SQUIRRFABL	RIBOFLAVIN	0.260000
SQUIRRFABL	THIAMIN	0.040000
SQUIRRFABL	VITAMIN_A	1101.000000
SQUIRRFAFL	ASCORBIC	1.100000
SQUIRRFAFL	AVAILABLE	0.056565
SQUIRRFAFL	CALCIUM	13.000000
SQUIRRFAFL	COST	542.000000
SQUIRRFAFL	IRON	1.100000
SQUIRRFAFL	KCALORIES	444.170000
SQUIRRFAFL	NIACIN	2.320000
SQUIRRFAFL	PHOSPHORUS	116.000000
SQUIRRFAFL	PROTEIN	15.300000
SQUIRRFAFL	RIBOFLAVIN	0.260000
SQUIRRFAFL	THIAMIN	0.040000
SQUIRRFAFL	VITAMIN_A	1101.000000
SQUIRRFAUP	ASCORBIC	1.100000
SQUIRRFAUP	AVAILABLE	0.204900
SQUIRRFAUP	CALCIUM	13.000000
SQUIRRFAUP	COST	542.000000
SQUIRRFAUP	IRON	1.100000
SQUIRRFAUP	KCALORIES	444.170000
SQUIRRFAUP	NIACIN	2.320000
SQUIRRFAUP	PHOSPHORUS	116.000000
SQUIRRFAUP	PROTEIN	15.300000
SQUIRRFAUP	RIBOFLAVIN	0.260000
SQUIRRFAUP	THIAMIN	0.040000

.	SQUIRRFAUP	VITAMIN_A	1101.000000
.	SQUIRRSPBL	ASCORBIC	1.100000
.	SQUIRRSPBL	AVAILABLE	0.123515
.	SQUIRRSPBL	CALCIUM	23.000000
.	SQUIRRSPBL	COST	1211.000000
.	SQUIRRSPBL	IRON	1.900000
.	SQUIRRSPBL	KCALORIES	112.660000
.	SQUIRRSPBL	NIACIN	4.000000
.	SQUIRRSPBL	PHOSPHORUS	200.000000
.	SQUIRRSPBL	PROTEIN	26.300000
.	SQUIRRSPBL	RIBOFLAVIN	0.350000
.	SQUIRRSPBL	THIAMIN	0.070000
.	SQUIRRSPBL	VITAMIN_A	1101.000000
.	SQUIRRSPFL	ASCORBIC	1.100000
.	SQUIRRSPFL	AVAILABLE	0.032765
.	SQUIRRSPFL	CALCIUM	23.000000
.	SQUIRRSPFL	COST	1211.000000
.	SQUIRRSPFL	IRON	1.900000
.	SQUIRRSPFL	KCALORIES	112.660000
.	SQUIRRSPFL	NIACIN	4.000000
.	SQUIRRSPFL	PHOSPHORUS	200.000000
.	SQUIRRSPFL	PROTEIN	26.300000
.	SQUIRRSPFL	RIBOFLAVIN	0.350000
.	SQUIRRSPFL	THIAMIN	0.070000
.	SQUIRRSPFL	VITAMIN_A	1101.000000
.	SQUIRRSPUP	ASCORBIC	1.100000
.	SQUIRRSPUP	AVAILABLE	0.118700
.	SQUIRRSPUP	CALCIUM	23.000000
.	SQUIRRSPUP	COST	1211.000000
.	SQUIRRSPUP	IRON	1.900000
.	SQUIRRSPUP	KCALORIES	112.660000
.	SQUIRRSPUP	NIACIN	4.000000
.	SQUIRRSPUP	PHOSPHORUS	200.000000
.	SQUIRRSPUP	PROTEIN	26.300000
.	SQUIRRSPUP	RIBOFLAVIN	0.350000
.	SQUIRRSPUP	THIAMIN	0.070000
.	SQUIRRSPUP	VITAMIN_A	1101.000000
.	SQUIRRSUBL	ASCORBIC	1.100000
.	SQUIRRSUBL	AVAILABLE	0.168230
.	SQUIRRSUBL	CALCIUM	18.000000
.	SQUIRRSUBL	COST	1015.000000
.	SQUIRRSUBL	IRON	1.500000
.	SQUIRRSUBL	KCALORIES	278.240000
.	SQUIRRSUBL	NIACIN	3.160000
.	SQUIRRSUBL	PHOSPHORUS	158.000000
.	SQUIRRSUBL	PROTEIN	20.800000
.	SQUIRRSUBL	RIBOFLAVIN	0.380000
.	SQUIRRSUBL	THIAMIN	0.060000
.	SQUIRRSUBL	VITAMIN_A	1101.000000
.	SQUIRRSUFL	ASCORBIC	1.100000
.	SQUIRRSUFL	AVAILABLE	0.044630
.	SQUIRRSUFL	CALCIUM	18.000000
.	SQUIRRSUFL	COST	1015.000000
.	SQUIRRSUFL	IRON	1.500000
.	SQUIRRSUFL	KCALORIES	278.240000
.	SQUIRRSUFL	NIACIN	3.160000
.	SQUIRRSUFL	PHOSPHORUS	158.000000
.	SQUIRRSUFL	PROTEIN	20.800000
.	SQUIRRSUFL	RIBOFLAVIN	0.380000
.	SQUIRRSUFL	THIAMIN	0.060000
.	SQUIRRSUFL	VITAMIN_A	1101.000000
.	SQUIRRSUUP	ASCORBIC	1.100000
.	SQUIRRSUUP	AVAILABLE	0.161670
.	SQUIRRSUUP	CALCIUM	18.000000
.	SQUIRRSUUP	COST	1015.000000
.	SQUIRRSUUP	IRON	1.500000
.	SQUIRRSUUP	KCALORIES	278.240000
.	SQUIRRSUUP	NIACIN	3.160000
.	SQUIRRSUUP	PHOSPHORUS	158.000000

SQUIRRSUUP	PROTEIN	20.800000
SQUIRRSUUP	RIBOFLAVIN	0.380000
SQUIRRSUUP	THIAMIN	0.060000
SQUIRRSUUP	VITAMIN_A	1101.000000
SUNFLOFAFL	ASCORBIC	0.000000
SUNFLOFAFL	AVAILABLE	454.850550
SUNFLOFAFL	CALCIUM	116.000000
SUNFLOFAFL	COST	0.000000
SUNFLOFAFL	IRON	6.770000
SUNFLOFAFL	KCALORIES	570.000000
SUNFLOFAFL	NIACIN	4.500000
SUNFLOFAFL	PHOSPHORUS	705.000000
SUNFLOFAFL	PROTEIN	22.780000
SUNFLOFAFL	RIBOFLAVIN	0.250000
SUNFLOFAFL	THIAMIN	2.290000
SUNFLOFAFL	VITAMIN_A	50.000000
TERRAPFARI	ASCORBIC	1.700000
TERRAPFARI	AVAILABLE	0.423050
TERRAPFARI	CALCIUM	107.000000
TERRAPFARI	COST	165.000000
TERRAPFARI	IRON	3.200000
TERRAPFARI	KCALORIES	110.990000
TERRAPFARI	NIACIN	4.800000
TERRAPFARI	PHOSPHORUS	183.000000
TERRAPFARI	PROTEIN	18.600000
TERRAPFARI	RIBOFLAVIN	0.690000
TERRAPFARI	THIAMIN	0.240000
TERRAPFARI	VITAMIN_A	1652.000000
TUBERFAFL	ASCORBIC	4.000000
TUBERFAFL	AVAILABLE	2.824660
TUBERFAFL	CALCIUM	14.000000
TUBERFAFL	COST	60.000000
TUBERFAFL	IRON	3.400000
TUBERFAFL	KCALORIES	69.900000
TUBERFAFL	NIACIN	1.300000
TUBERFAFL	PHOSPHORUS	78.000000
TUBERFAFL	PROTEIN	2.300000
TUBERFAFL	RIBOFLAVIN	0.060000
TUBERFAFL	THIAMIN	0.200000
TUBERFAFL	VITAMIN_A	20.000000
TUBERSPFL	ASCORBIC	4.000000
TUBERSPFL	AVAILABLE	2.720080
TUBERSPFL	CALCIUM	14.000000
TUBERSPFL	COST	85.000000
TUBERSPFL	IRON	3.400000
TUBERSPFL	KCALORIES	69.900000
TUBERSPFL	NIACIN	1.300000
TUBERSPFL	PHOSPHORUS	78.000000
TUBERSPFL	PROTEIN	2.300000
TUBERSPFL	RIBOFLAVIN	0.060000
TUBERSPFL	THIAMIN	0.200000
TUBERSPFL	VITAMIN_A	20.000000
TUBERSUFL	ASCORBIC	4.000000
TUBERSUFL	AVAILABLE	0.523150
TUBERSUFL	CALCIUM	14.000000
TUBERSUFL	COST	85.000000
TUBERSUFL	IRON	3.400000
TUBERSUFL	KCALORIES	69.900000
TUBERSUFL	NIACIN	1.300000
TUBERSUFL	PHOSPHORUS	78.000000
TUBERSUFL	PROTEIN	2.300000
TUBERSUFL	RIBOFLAVIN	0.060000
TUBERSUFL	THIAMIN	0.200000
TUBERSUFL	VITAMIN_A	20.000000
TURKEYFAFL	ASCORBIC	1.800000
TURKEYFAFL	AVAILABLE	0.116845
TURKEYFAFL	CALCIUM	6.000000
TURKEYFAFL	COST	146.000000
TURKEYFAFL	IRON	1.200000

.	TURKEYFAFL	KCALORIES	342.850000
.	TURKEYFAFL	NIACIN	6.120000
.	TURKEYFAFL	PHOSPHORUS	162.000000
.	TURKEYFAFL	PROTEIN	18.400000
.	TURKEYFAFL	RIBOFLAVIN	0.130000
.	TURKEYFAFL	THIAMIN	0.060000
.	TURKEYFAFL	VITAMIN_A	531.000000
.	TURKEYFAUP	ASCORBIC	1.800000
.	TURKEYFAUP	AVAILABLE	0.423270
.	TURKEYFAUP	CALCIUM	6.000000
.	TURKEYFAUP	COST	146.000000
.	TURKEYFAUP	IRON	1.200000
.	TURKEYFAUP	KCALORIES	342.850000
.	TURKEYFAUP	NIACIN	6.120000
.	TURKEYFAUP	PHOSPHORUS	162.000000
.	TURKEYFAUP	PROTEIN	18.400000
.	TURKEYFAUP	RIBOFLAVIN	0.130000
.	TURKEYFAUP	THIAMIN	0.060000
.	TURKEYFAUP	VITAMIN_A	531.000000
.	TURKEYSPFL	ASCORBIC	1.800000
.	TURKEYSPFL	AVAILABLE	0.093810
.	TURKEYSPFL	CALCIUM	8.000000
.	TURKEYSPFL	COST	283.000000
.	TURKEYSPFL	IRON	1.400000
.	TURKEYSPFL	KCALORIES	226.490000
.	TURKEYSPFL	NIACIN	7.420000
.	TURKEYSPFL	PHOSPHORUS	197.000000
.	TURKEYSPFL	PROTEIN	22.200000
.	TURKEYSPFL	RIBOFLAVIN	0.160000
.	TURKEYSPFL	THIAMIN	0.080000
.	TURKEYSPFL	VITAMIN_A	531.000000
.	TURKEYSPUP	ASCORBIC	1.800000
.	TURKEYSPUP	AVAILABLE	0.339830
.	TURKEYSPUP	CALCIUM	8.000000
.	TURKEYSPUP	COST	283.000000
.	TURKEYSPUP	IRON	1.400000
.	TURKEYSPUP	KCALORIES	226.490000
.	TURKEYSPUP	NIACIN	7.420000
.	TURKEYSPUP	PHOSPHORUS	197.000000
.	TURKEYSPUP	PROTEIN	22.200000
.	TURKEYSPUP	RIBOFLAVIN	0.160000
.	TURKEYSPUP	THIAMIN	0.080000
.	TURKEYSPUP	VITAMIN_A	531.000000
.	TURKEYSUFL	ASCORBIC	1.800000
.	TURKEYSUFL	AVAILABLE	0.070680
.	TURKEYSUFL	CALCIUM	8.000000
.	TURKEYSUFL	COST	305.000000
.	TURKEYSUFL	IRON	1.500000
.	TURKEYSUFL	KCALORIES	158.310000
.	TURKEYSUFL	NIACIN	8.160000
.	TURKEYSUFL	PHOSPHORUS	216.000000
.	TURKEYSUFL	PROTEIN	24.400000
.	TURKEYSUFL	RIBOFLAVIN	0.170000
.	TURKEYSUFL	THIAMIN	0.080000
.	TURKEYSUFL	VITAMIN_A	531.000000
.	TURKEYSUUP	ASCORBIC	1.800000
.	TURKEYSUUP	AVAILABLE	0.256045
.	TURKEYSUUP	CALCIUM	8.000000
.	TURKEYSUUP	COST	305.000000
.	TURKEYSUUP	IRON	1.500000
.	TURKEYSUUP	KCALORIES	158.310000
.	TURKEYSUUP	NIACIN	8.160000
.	TURKEYSUUP	PHOSPHORUS	216.000000
.	TURKEYSUUP	PROTEIN	24.400000
.	TURKEYSUUP	RIBOFLAVIN	0.170000
.	TURKEYSUUP	THIAMIN	0.080000
.	TURKEYSUUP	VITAMIN_A	531.000000
.	WALNUTFAFL	ASCORBIC	2.000000
.	WALNUTFAFL	AVAILABLE	137.465940

```
.     WALNUTFAFL  CALCIUM          0.000000
.     WALNUTFAFL  COST           887.000000
.     WALNUTFAFL  IRON             6.000000
.     WALNUTFAFL  KCALORIES      627.720000
.     WALNUTFAFL  NIACIN           0.700000
.     WALNUTFAFL  PHOSPHORUS     570.000000
.     WALNUTFAFL  PROTEIN         20.500000
.     WALNUTFAFL  RIBOFLAVIN       0.110000
.     WALNUTFAFL  THIAMIN          0.220000
.     WALNUTFAFL  VITAMIN_A      300.000000
.     _RHS_       COST             0
.     _RHS_       KCALORIES     1386
.     _RHS_       PROTEIN         26.46
.     _RHS_       CALCIUM       541.8
.     _RHS_       PHOSPHORUS    541.8
.     _RHS_       IRON            8.19
.     _RHS_       VITAMIN_A     1827
.     _RHS_       THIAMIN          .567
.     _RHS_       RIBOFLAVIN       .630
.     _RHS_       NIACIN          7.56
.     _RHS_       ASCORBIC        18.9
PROC LP SPARSEDATA RANGEPRICE;
RUN;
/*
```

```
//R137HSPR JOB (,,5,1),PRENTICE,CLASS=2,
//       USER=POTTERY,PASSWORD=
/*ROUTE PRINT NER.R0
// EXEC SAS
DATA;
  INPUT _TYPE_ $ @10 _COL_ $13. @24 _ROW_ $16. _COEF_;
  CARDS;
MIN     .             COST              .
GE      .             KCALORIES         .
GE      .             PROTEIN           .
GE      .             CALCIUM           .
GE      .             PHOSPHORUS        .
GE      .             IRON              .
GE      .             VITAMIN_A         .
GE      .             THIAMIN           .
GE      .             RIBOFLAVIN        .
GE      .             NIACIN            .
GE      .             ASCORBIC          .
UPPERBD .             AVAILABLE         .
.       AMARANSPFL    ASCORBIC          98.700000
.       AMARANSPFL    AVAILABLE         3.784210
.       AMARANSPFL    CALCIUM           210.000000
.       AMARANSPFL    COST              44.000000
.       AMARANSPFL    IRON              2.300000
.       AMARANSPFL    KCALORIES         33.870000
.       AMARANSPFL    NIACIN            1.270000
.       AMARANSPFL    PHOSPHORUS        52.000000
.       AMARANSPFL    PROTEIN           3.400000
.       AMARANSPFL    RIBOFLAVIN        0.310000
.       AMARANSPFL    THIAMIN           0.110000
.       AMARANSPFL    VITAMIN_A         8800.000000
.       BEARFABL      ASCORBIC          1.300000
.       BEARFABL      AVAILABLE         0.166295
.       BEARFABL      CALCIUM           9.000000
.       BEARFABL      COST              363.000000
.       BEARFABL      IRON              2.200000
.       BEARFABL      KCALORIES         334.170000
.       BEARFABL      NIACIN            5.050000
.       BEARFABL      PHOSPHORUS        158.000000
.       BEARFABL      PROTEIN           17.000000
.       BEARFABL      RIBOFLAVIN        0.340000
.       BEARFABL      THIAMIN           0.620000
.       BEARFABL      VITAMIN_A         551.000000
.       BEARFAFL      ASCORBIC          1.300000
.       BEARFAFL      AVAILABLE         0.044115
.       BEARFAFL      CALCIUM           9.000000
.       BEARFAFL      COST              363.000000
.       BEARFAFL      IRON              2.200000
.       BEARFAFL      KCALORIES         334.170000
.       BEARFAFL      NIACIN            5.050000
.       BEARFAFL      PHOSPHORUS        158.000000
.       BEARFAFL      PROTEIN           17.000000
.       BEARFAFL      RIBOFLAVIN        0.340000
.       BEARFAFL      THIAMIN           0.620000
.       BEARFAFL      VITAMIN_A         551.000000
.       BEARFAUP      ASCORBIC          1.300000
.       BEARFAUP      AVAILABLE         0.159810
.       BEARFAUP      CALCIUM           9.000000
.       BEARFAUP      COST              363.000000
.       BEARFAUP      IRON              2.200000
.       BEARFAUP      KCALORIES         334.170000
.       BEARFAUP      NIACIN            5.050000
.       BEARFAUP      PHOSPHORUS        158.000000
.       BEARFAUP      PROTEIN           17.000000
.       BEARFAUP      RIBOFLAVIN        0.340000
.       BEARFAUP      THIAMIN           0.620000
.       BEARFAUP      VITAMIN_A         551.000000
.       BEARSPBL      ASCORBIC          1.300000
.       BEARSPBL      AVAILABLE         0.124290
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.	BEARSPBL	CALCIUM	12.000000
.	BEARSPBL	COST	440.000000
.	BEARSPBL	IRON	3.000000
.	BEARSPBL	KCALORIES	134.290000
.	BEARSPBL	NIACIN	6.820000
.	BEARSPBL	PHOSPHORUS	213.000000
.	BEARSPBL	PROTEIN	23.000000
.	BEARSPBL	RIBOFLAVIN	0.470000
.	BEARSPBL	THIAMIN	0.850000
.	BEARSPBL	VITAMIN_A	551.000000
.	BEARSPFL	ASCORBIC	1.300000
.	BEARSPFL	AVAILABLE	0.032975
.	BEARSPFL	CALCIUM	12.000000
.	BEARSPFL	COST	440.000000
.	BEARSPFL	IRON	3.000000
.	BEARSPFL	KCALORIES	134.290000
.	BEARSPFL	NIACIN	6.820000
.	BEARSPFL	PHOSPHORUS	213.000000
.	BEARSPFL	PROTEIN	23.000000
.	BEARSPFL	RIBOFLAVIN	0.470000
.	BEARSPFL	THIAMIN	0.850000
.	BEARSPFL	VITAMIN_A	551.000000
.	BEARSPUP	ASCORBIC	1.300000
.	BEARSPUP	AVAILABLE	0.119445
.	BEARSPUP	CALCIUM	12.000000
.	BEARSPUP	COST	440.000000
.	BEARSPUP	IRON	3.000000
.	BEARSPUP	KCALORIES	134.290000
.	BEARSPUP	NIACIN	6.820000
.	BEARSPUP	PHOSPHORUS	213.000000
.	BEARSPUP	PROTEIN	23.000000
.	BEARSPUP	RIBOFLAVIN	0.470000
.	BEARSPUP	THIAMIN	0.850000
.	BEARSPUP	VITAMIN_A	551.000000
.	BEARWIBL	ASCORBIC	1.300000
.	BEARWIBL	AVAILABLE	0.145300
.	BEARWIBL	CALCIUM	10.000000
.	BEARWIBL	COST	239.000000
.	BEARWIBL	IRON	2.400000
.	BEARWIBL	KCALORIES	254.200000
.	BEARWIBL	NIACIN	5.560000
.	BEARWIBL	PHOSPHORUS	174.000000
.	BEARWIBL	PROTEIN	19.400000
.	BEARWIBL	RIBOFLAVIN	0.390000
.	BEARWIBL	THIAMIN	0.720000
.	BEARWIBL	VITAMIN_A	551.000000
.	BEARWIFL	ASCORBIC	1.300000
.	BEARWIFL	AVAILABLE	0.038545
.	BEARWIFL	CALCIUM	10.000000
.	BEARWIFL	COST	239.000000
.	BEARWIFL	IRON	2.400000
.	BEARWIFL	KCALORIES	254.200000
.	BEARWIFL	NIACIN	5.560000
.	BEARWIFL	PHOSPHORUS	174.000000
.	BEARWIFL	PROTEIN	19.400000
.	BEARWIFL	RIBOFLAVIN	0.390000
.	BEARWIFL	THIAMIN	0.720000
.	BEARWIFL	VITAMIN_A	551.000000
.	BEARWIUP	ASCORBIC	1.300000
.	BEARWIUP	AVAILABLE	0.139635
.	BEARWIUP	CALCIUM	10.000000
.	BEARWIUP	COST	239.000000
.	BEARWIUP	IRON	2.400000
.	BEARWIUP	KCALORIES	254.200000
.	BEARWIUP	NIACIN	5.560000
.	BEARWIUP	PHOSPHORUS	174.000000
.	BEARWIUP	PROTEIN	19.400000
.	BEARWIUP	RIBOFLAVIN	0.390000
.	BEARWIUP	THIAMIN	0.720000

BEARWIUP	VITAMIN_A	551.000000
BEAVERFARI	ASCORBIC	1.800000
BEAVERFARI	AVAILABLE	0.008570
BEAVERFARI	CALCIUM	9.000000
BEAVERFARI	COST	205.000000
BEAVERFARI	IRON	2.200000
BEAVERFARI	KCALORIES	200.100000
BEAVERFARI	NIACIN	5.050000
BEAVERFARI	PHOSPHORUS	158.000000
BEAVERFARI	PROTEIN	21.300000
BEAVERFARI	RIBOFLAVIN	0.390000
BEAVERFARI	THIAMIN	0.100000
BEAVERFARI	VITAMIN_A	1101.000000
BEAVERSPRI	ASCORBIC	1.800000
BEAVERSPRI	AVAILABLE	0.008570
BEAVERSPRI	CALCIUM	9.000000
BEAVERSPRI	COST	170.000000
BEAVERSPRI	IRON	2.200000
BEAVERSPRI	KCALORIES	200.100000
BEAVERSPRI	NIACIN	5.050000
BEAVERSPRI	PHOSPHORUS	158.000000
BEAVERSPRI	PROTEIN	21.300000
BEAVERSPRI	RIBOFLAVIN	0.390000
BEAVERSPRI	THIAMIN	0.100000
BEAVERSPRI	VITAMIN_A	1101.000000
BEAVERWIRI	ASCORBIC	1.800000
BEAVERWIRI	AVAILABLE	0.008570
BEAVERWIRI	CALCIUM	9.000000
BEAVERWIRI	COST	205.000000
BEAVERWIRI	IRON	2.200000
BEAVERWIRI	KCALORIES	200.100000
BEAVERWIRI	NIACIN	5.050000
BEAVERWIRI	PHOSPHORUS	158.000000
BEAVERWIRI	PROTEIN	21.300000
BEAVERWIRI	RIBOFLAVIN	0.390000
BEAVERWIRI	THIAMIN	0.100000
BEAVERWIRI	VITAMIN_A	1101.000000
BOXTURSPBL	ASCORBIC	1.700000
BOXTURSPBL	AVAILABLE	0.448140
BOXTURSPBL	CALCIUM	107.000000
BOXTURSPBL	COST	600.000000
BOXTURSPBL	IRON	3.200000
BOXTURSPBL	KCALORIES	110.990000
BOXTURSPBL	NIACIN	4.800000
BOXTURSPBL	PHOSPHORUS	183.000000
BOXTURSPBL	PROTEIN	18.200000
BOXTURSPBL	RIBOFLAVIN	0.690000
BOXTURSPBL	THIAMIN	0.240000
BOXTURSPBL	VITAMIN_A	1652.000000
BOXTURSPFL	ASCORBIC	1.700000
BOXTURSPFL	AVAILABLE	0.118887
BOXTURSPFL	CALCIUM	107.000000
BOXTURSPFL	COST	600.000000
BOXTURSPFL	IRON	3.200000
BOXTURSPFL	KCALORIES	110.990000
BOXTURSPFL	NIACIN	4.800000
BOXTURSPFL	PHOSPHORUS	183.000000
BOXTURSPFL	PROTEIN	18.200000
BOXTURSPFL	RIBOFLAVIN	0.690000
BOXTURSPFL	THIAMIN	0.240000
BOXTURSPFL	VITAMIN_A	1652.000000
BOXTURSPUP	ASCORBIC	1.700000
BOXTURSPUP	AVAILABLE	0.430667
BOXTURSPUP	CALCIUM	107.000000
BOXTURSPUP	COST	600.000000
BOXTURSPUP	IRON	3.200000
BOXTURSPUP	KCALORIES	110.990000
BOXTURSPUP	NIACIN	4.800000
BOXTURSPUP	PHOSPHORUS	183.000000

.	BOXTURSPUP	PROTEIN	18.200000
.	BOXTURSPUP	RIBOFLAVIN	0.690000
.	BOXTURSPUP	THIAMIN	0.240000
.	BOXTURSPUP	VITAMIN_A	1652.000000
.	C_PODGSPFL	ASCORBIC	98.700000
.	C_PODGSPFL	AVAILABLE	0.787830
.	C_PODGSPFL	CALCIUM	210.000000
.	C_PODGSPFL	COST	44.000000
.	C_PODGSPFL	IRON	2.300000
.	C_PODGSPFL	KCALORIES	33.870000
.	C_PODGSPFL	NIACIN	1.270000
.	C_PODGSPFL	PHOSPHORUS	52.000000
.	C_PODGSPFL	PROTEIN	3.400000
.	C_PODGSPFL	RIBOFLAVIN	0.310000
.	C_PODGSPFL	THIAMIN	0.110000
.	C_PODGSPFL	VITAMIN_A	8800.000000
.	C_PODSFAFL	ASCORBIC	0.000000
.	C_PODSFAFL	AVAILABLE	577.790160
.	C_PODSFAFL	CALCIUM	128.000000
.	C_PODSFAFL	COST	163.000000
.	C_PODSFAFL	IRON	12.800000
.	C_PODSFAFL	KCALORIES	362.690000
.	C_PODSFAFL	NIACIN	1.470000
.	C_PODSFAFL	PHOSPHORUS	442.000000
.	C_PODSFAFL	PROTEIN	12.600000
.	C_PODSFAFL	RIBOFLAVIN	6.430000
.	C_PODSFAFL	THIAMIN	0.650000
.	C_PODSFAFL	VITAMIN_A	20.000000
.	DEERFAUP	ASCORBIC	1.500000
.	DEERFAUP	AVAILABLE	1.767090
.	DEERFAUP	CALCIUM	8.000000
.	DEERFAUP	COST	118.000000
.	DEERFAUP	IRON	2.200000
.	DEERFAUP	KCALORIES	255.550000
.	DEERFAUP	NIACIN	5.290000
.	DEERFAUP	PHOSPHORUS	209.000000
.	DEERFAUP	PROTEIN	17.600000
.	DEERFAUP	RIBOFLAVIN	0.430000
.	DEERFAUP	THIAMIN	0.200000
.	DEERFAUP	VITAMIN_A	826.000000
.	DEERSPFL	ASCORBIC	0.000000
.	DEERSPFL	AVAILABLE	0.406635
.	DEERSPFL	CALCIUM	10.000000
.	DEERSPFL	COST	97.000000
.	DEERSPFL	IRON	2.600000
.	DEERSPFL	KCALORIES	125.750000
.	DEERSPFL	NIACIN	6.300000
.	DEERSPFL	PHOSPHORUS	249.000000
.	DEERSPFL	PROTEIN	21.000000
.	DEERSPFL	RIBOFLAVIN	0.510000
.	DEERSPFL	THIAMIN	0.230000
.	DEERSPFL	VITAMIN_A	826.000000
.	DEERWIUP	ASCORBIC	1.500000
.	DEERWIUP	AVAILABLE	1.624435
.	DEERWIUP	CALCIUM	9.000000
.	DEERWIUP	COST	160.000000
.	DEERWIUP	IRON	2.400000
.	DEERWIUP	KCALORIES	198.340000
.	DEERWIUP	NIACIN	5.730000
.	DEERWIUP	PHOSPHORUS	227.000000
.	DEERWIUP	PROTEIN	19.200000
.	DEERWIUP	RIBOFLAVIN	0.470000
.	DEERWIUP	THIAMIN	0.210000
.	DEERWIUP	VITAMIN_A	826.000000
.	DUCKSPRI	ASCORBIC	2.100000
.	DUCKSPRI	AVAILABLE	0.177620
.	DUCKSPRI	CALCIUM	10.000000
.	DUCKSPRI	COST	4178.000000
.	DUCKSPRI	IRON	1.600000

.	DUCKSPRI	KCALORIES	254.260000
.	DUCKSPRI	NIACIN	6.700000
.	DUCKSPRI	PHOSPHORUS	176.000000
.	DUCKSPRI	PROTEIN	20.200000
.	DUCKSPRI	RIBOFLAVIN	0.290000
.	DUCKSPRI	THIAMIN	0.080000
.	DUCKSPRI	VITAMIN_A	1377.000000
.	FISHFARI	ASCORBIC	3.000000
.	FISHFARI	AVAILABLE	30.710150
.	FISHFARI	CALCIUM	15.000000
.	FISHFARI	COST	63.000000
.	FISHFARI	IRON	1.500000
.	FISHFARI	KCALORIES	153.620000
.	FISHFARI	NIACIN	3.000000
.	FISHFARI	PHOSPHORUS	200.000000
.	FISHFARI	PROTEIN	17.600000
.	FISHFARI	RIBOFLAVIN	0.120000
.	FISHFARI	THIAMIN	0.060000
.	FISHFARI	VITAMIN_A	21.000000
.	FISHSPRI	ASCORBIC	3.000000
.	FISHSPRI	AVAILABLE	30.710150
.	FISHSPRI	CALCIUM	15.000000
.	FISHSPRI	COST	56.000000
.	FISHSPRI	IRON	1.500000
.	FISHSPRI	KCALORIES	153.620000
.	FISHSPRI	NIACIN	3.000000
.	FISHSPRI	PHOSPHORUS	200.000000
.	FISHSPRI	PROTEIN	17.600000
.	FISHSPRI	RIBOFLAVIN	0.120000
.	FISHSPRI	THIAMIN	0.060000
.	FISHSPRI	VITAMIN_A	21.000000
.	GREENSSPFL	ASCORBIC	94.000000
.	GREENSSPFL	AVAILABLE	1.033880
.	GREENSSPFL	CALCIUM	74.000000
.	GREENSSPFL	COST	100.000000
.	GREENSSPFL	IRON	1.400000
.	GREENSSPFL	KCALORIES	29.860000
.	GREENSSPFL	NIACIN	0.750000
.	GREENSSPFL	PHOSPHORUS	58.000000
.	GREENSSPFL	PROTEIN	2.400000
.	GREENSSPFL	RIBOFLAVIN	0.240000
.	GREENSSPFL	THIAMIN	0.080000
.	GREENSSPFL	VITAMIN_A	11100.000000
.	HAWTHOFAFL	ASCORBIC	22.300000
.	HAWTHOFAFL	AVAILABLE	0.072200
.	HAWTHOFAFL	CALCIUM	85.000000
.	HAWTHOFAFL	COST	81.000000
.	HAWTHOFAFL	IRON	2.100000
.	HAWTHOFAFL	KCALORIES	92.000000
.	HAWTHOFAFL	NIACIN	0.430000
.	HAWTHOFAFL	PHOSPHORUS	25.000000
.	HAWTHOFAFL	PROTEIN	0.400000
.	HAWTHOFAFL	RIBOFLAVIN	0.050000
.	HAWTHOFAFL	THIAMIN	0.060000
.	HAWTHOFAFL	VITAMIN_A	303.000000
.	HAZELNFAFL	ASCORBIC	0.000000
.	HAZELNFAFL	AVAILABLE	0.243020
.	HAZELNFAFL	CALCIUM	209.000000
.	HAZELNFAFL	COST	1287.000000
.	HAZELNFAFL	IRON	3.400000
.	HAZELNFAFL	KCALORIES	633.980000
.	HAZELNFAFL	NIACIN	0.900000
.	HAZELNFAFL	PHOSPHORUS	337.000000
.	HAZELNFAFL	PROTEIN	12.600000
.	HAZELNFAFL	RIBOFLAVIN	0.410000
.	HAZELNFAFL	THIAMIN	0.460000
.	HAZELNFAFL	VITAMIN_A	25.000000
.	HICKORFAUP	ASCORBIC	0.000000
.	HICKORFAUP	AVAILABLE	69.030210

HICKORFAUP	CALCIUM	0.000000
HICKORFAUP	COST	277.000000
HICKORFAUP	IRON	2.400000
HICKORFAUP	KCALORIES	672.920000
HICKORFAUP	NIACIN	0.800000
HICKORFAUP	PHOSPHORUS	360.000000
HICKORFAUP	PROTEIN	13.200000
HICKORFAUP	RIBOFLAVIN	0.110000
HICKORFAUP	THIAMIN	0.340000
HICKORFAUP	VITAMIN_A	150.000000
MAIZEFAFL	ASCORBIC	0.000000
MAIZEFAFL	AVAILABLE	1134.180675
MAIZEFAFL	CALCIUM	16.000000
MAIZEFAFL	COST	83.700000
MAIZEFAFL	IRON	4.100000
MAIZEFAFL	KCALORIES	354.240000
MAIZEFAFL	NIACIN	1.500000
MAIZEFAFL	PHOSPHORUS	202.000000
MAIZEFAFL	PROTEIN	9.800000
MAIZEFAFL	RIBOFLAVIN	0.130000
MAIZEFAFL	THIAMIN	0.300000
MAIZEFAFL	VITAMIN_A	125.000000
MUSHROSPUP	ASCORBIC	3.500000
MUSHROSPUP	AVAILABLE	2.615380
MUSHROSPUP	CALCIUM	5.000000
MUSHROSPUP	COST	110.000000
MUSHROSPUP	IRON	1.240000
MUSHROSPUP	KCALORIES	25.000000
MUSHROSPUP	NIACIN	4.120000
MUSHROSPUP	PHOSPHORUS	104.000000
MUSHROSPUP	PROTEIN	2.090000
MUSHROSPUP	RIBOFLAVIN	0.450000
MUSHROSPUP	THIAMIN	0.100000
MUSHROSPUP	VITAMIN_A	0.000000
MUSKRAFARI	ASCORBIC	1.500000
MUSKRAFARI	AVAILABLE	0.472240
MUSKRAFARI	CALCIUM	9.000000
MUSKRAFARI	COST	543.000000
MUSKRAFARI	IRON	2.200000
MUSKRAFARI	KCALORIES	117.440000
MUSKRAFARI	NIACIN	5.040000
MUSKRAFARI	PHOSPHORUS	158.000000
MUSKRAFARI	PROTEIN	19.900000
MUSKRAFARI	RIBOFLAVIN	0.200000
MUSKRAFARI	THIAMIN	0.210000
MUSKRAFARI	VITAMIN_A	826.000000
MUSKRASPRI	ASCORBIC	1.500000
MUSKRASPRI	AVAILABLE	0.472240
MUSKRASPRI	CALCIUM	9.000000
MUSKRASPRI	COST	480.000000
MUSKRASPRI	IRON	2.200000
MUSKRASPRI	KCALORIES	117.440000
MUSKRASPRI	NIACIN	5.040000
MUSKRASPRI	PHOSPHORUS	158.000000
MUSKRASPRI	PROTEIN	19.900000
MUSKRASPRI	RIBOFLAVIN	0.200000
MUSKRASPRI	THIAMIN	0.210000
MUSKRASPRI	VITAMIN_A	826.000000
MUSKRAWIRI	ASCORBIC	1.500000
MUSKRAWIRI	AVAILABLE	0.472240
MUSKRAWIRI	CALCIUM	9.000000
MUSKRAWIRI	COST	543.000000
MUSKRAWIRI	IRON	2.200000
MUSKRAWIRI	KCALORIES	117.440000
MUSKRAWIRI	NIACIN	5.040000
MUSKRAWIRI	PHOSPHORUS	158.000000
MUSKRAWIRI	PROTEIN	19.900000
MUSKRAWIRI	RIBOFLAVIN	0.200000
MUSKRAWIRI	THIAMIN	0.210000

MUSKRAWIRI	VITAMIN_A	826.000000
OPOSSUFAFL	ASCORBIC	1.800000
OPOSSUFAFL	AVAILABLE	0.055730
OPOSSUFAFL	CALCIUM	9.000000
OPOSSUFAFL	COST	219.000000
OPOSSUFAFL	IRON	2.200000
OPOSSUFAFL	KCALORIES	262.380000
OPOSSUFAFL	NIACIN	35.050000
OPOSSUFAFL	PHOSPHORUS	158.000000
OPOSSUFAFL	PROTEIN	19.200000
OPOSSUFAFL	RIBOFLAVIN	0.340000
OPOSSUFAFL	THIAMIN	0.140000
OPOSSUFAFL	VITAMIN_A	1101.000000
OPOSSUSPFL	ASCORBIC	1.800000
OPOSSUSPFL	AVAILABLE	0.055730
OPOSSUSPFL	CALCIUM	11.000000
OPOSSUSPFL	COST	269.000000
OPOSSUSPFL	IRON	2.600000
OPOSSUSPFL	KCALORIES	134.290000
OPOSSUSPFL	NIACIN	6.060000
OPOSSUSPFL	PHOSPHORUS	190.000000
OPOSSUSPFL	PROTEIN	23.000000
OPOSSUSPFL	RIBOFLAVIN	0.400000
OPOSSUSPFL	THIAMIN	0.000000
OPOSSUSPFL	VITAMIN_A	1101.000000
OPOSSUWIFL	ASCORBIC	1.800000
OPOSSUWIFL	AVAILABLE	0.055730
OPOSSUWIFL	CALCIUM	10.000000
OPOSSUWIFL	COST	289.000000
OPOSSUWIFL	IRON	2.400000
OPOSSUWIFL	KCALORIES	204.700000
OPOSSUWIFL	NIACIN	5.500000
OPOSSUWIFL	PHOSPHORUS	172.000000
OPOSSUWIFL	PROTEIN	20.900000
OPOSSUWIFL	RIBOFLAVIN	0.370000
OPOSSUWIFL	THIAMIN	0.150000
OPOSSUWIFL	VITAMIN_A	1101.000000
PLUMFAFL	ASCORBIC	4.000000
PLUMFAFL	AVAILABLE	1.010780
PLUMFAFL	CALCIUM	12.000000
PLUMFAFL	COST	46.000000
PLUMFAFL	IRON	0.500000
PLUMFAFL	KCALORIES	75.280000
PLUMFAFL	NIACIN	0.500000
PLUMFAFL	PHOSPHORUS	18.000000
PLUMFAFL	PROTEIN	0.800000
PLUMFAFL	RIBOFLAVIN	0.030000
PLUMFAFL	THIAMIN	0.030000
PLUMFAFL	VITAMIN_A	300.000000
POKEGRSPBL	ASCORBIC	98.700000
POKEGRSPBL	AVAILABLE	0.974300
POKEGRSPBL	CALCIUM	210.000000
POKEGRSPBL	COST	44.000000
POKEGRSPBL	IRON	2.300000
POKEGRSPBL	KCALORIES	33.870000
POKEGRSPBL	NIACIN	1.270000
POKEGRSPBL	PHOSPHORUS	52.000000
POKEGRSPBL	PROTEIN	3.400000
POKEGRSPBL	RIBOFLAVIN	0.310000
POKEGRSPBL	THIAMIN	0.110000
POKEGRSPBL	VITAMIN_A	8800.000000
RABBITFABL	ASCORBIC	1.800000
RABBITFABL	AVAILABLE	0.272940
RABBITFABL	CALCIUM	9.000000
RABBITFABL	COST	219.000000
RABBITFABL	IRON	2.200000
RABBITFABL	KCALORIES	262.380000
RABBITFABL	NIACIN	35.050000
RABBITFABL	PHOSPHORUS	158.000000

RABBITFABL	PROTEIN	19.200000
RABBITFABL	RIBOFLAVIN	0.340000
RABBITFABL	THIAMIN	0.140000
RABBITFABL	VITAMIN_A	1101.000000
RABBITFAFL	ASCORBIC	1.800000
RABBITFAFL	AVAILABLE	0.072410
RABBITFAFL	CALCIUM	9.000000
RABBITFAFL	COST	219.000000
RABBITFAFL	IRON	2.200000
RABBITFAFL	KCALORIES	262.380000
RABBITFAFL	NIACIN	35.050000
RABBITFAFL	PHOSPHORUS	158.000000
RABBITFAFL	PROTEIN	19.200000
RABBITFAFL	RIBOFLAVIN	0.340000
RABBITFAFL	THIAMIN	0.140000
RABBITFAFL	VITAMIN_A	1101.000000
RABBITFAUP	ASCORBIC	1.800000
RABBITFAUP	AVAILABLE	0.262295
RABBITFAUP	CALCIUM	9.000000
RABBITFAUP	COST	219.000000
RABBITFAUP	IRON	2.200000
RABBITFAUP	KCALORIES	262.380000
RABBITFAUP	NIACIN	35.050000
RABBITFAUP	PHOSPHORUS	158.000000
RABBITFAUP	PROTEIN	19.200000
RABBITFAUP	RIBOFLAVIN	0.340000
RABBITFAUP	THIAMIN	0.140000
RABBITFAUP	VITAMIN_A	1101.000000
RABBITSPBL	ASCORBIC	1.800000
RABBITSPBL	AVAILABLE	0.211435
RABBITSPBL	CALCIUM	11.000000
RABBITSPBL	COST	269.000000
RABBITSPBL	IRON	2.600000
RABBITSPBL	KCALORIES	134.290000
RABBITSPBL	NIACIN	6.060000
RABBITSPBL	PHOSPHORUS	190.000000
RABBITSPBL	PROTEIN	23.000000
RABBITSPBL	RIBOFLAVIN	0.400000
RABBITSPBL	THIAMIN	0.000000
RABBITSPBL	VITAMIN_A	1101.000000
RABBITSPFL	ASCORBIC	1.800000
RABBITSPFL	AVAILABLE	0.056090
RABBITSPFL	CALCIUM	11.000000
RABBITSPFL	COST	269.000000
RABBITSPFL	IRON	2.600000
RABBITSPFL	KCALORIES	134.290000
RABBITSPFL	NIACIN	6.060000
RABBITSPFL	PHOSPHORUS	190.000000
RABBITSPFL	PROTEIN	23.000000
RABBITSPFL	RIBOFLAVIN	0.400000
RABBITSPFL	THIAMIN	0.000000
RABBITSPFL	VITAMIN_A	1101.000000
RABBITSPUP	ASCORBIC	1.800000
RABBITSPUP	AVAILABLE	0.203190
RABBITSPUP	CALCIUM	11.000000
RABBITSPUP	COST	269.000000
RABBITSPUP	IRON	2.600000
RABBITSPUP	KCALORIES	134.290000
RABBITSPUP	NIACIN	6.060000
RABBITSPUP	PHOSPHORUS	190.000000
RABBITSPUP	PROTEIN	23.000000
RABBITSPUP	RIBOFLAVIN	0.400000
RABBITSPUP	THIAMIN	0.000000
RABBITSPUP	VITAMIN_A	1101.000000
RABBITWIBL	ASCORBIC	1.800000
RABBITWIBL	AVAILABLE	0.272940
RABBITWIBL	CALCIUM	10.000000
RABBITWIBL	COST	289.000000
RABBITWIBL	IRON	2.400000

RABBITWIBL	KCALORIES	204.700000
RABBITWIBL	NIACIN	5.500000
RABBITWIBL	PHOSPHORUS	172.000000
RABBITWIBL	PROTEIN	20.900000
RABBITWIBL	RIBOFLAVIN	0.370000
RABBITWIBL	THIAMIN	0.150000
RABBITWIBL	VITAMIN_A	1101.000000
RABBITWIFL	ASCORBIC	1.800000
RABBITWIFL	AVAILABLE	0.072410
RABBITWIFL	CALCIUM	10.000000
RABBITWIFL	COST	289.000000
RABBITWIFL	IRON	2.400000
RABBITWIFL	KCALORIES	204.700000
RABBITWIFL	NIACIN	5.500000
RABBITWIFL	PHOSPHORUS	172.000000
RABBITWIFL	PROTEIN	20.900000
RABBITWIFL	RIBOFLAVIN	0.370000
RABBITWIFL	THIAMIN	0.150000
RABBITWIFL	VITAMIN_A	1101.000000
RABBITWIUP	ASCORBIC	1.800000
RABBITWIUP	AVAILABLE	0.262295
RABBITWIUP	CALCIUM	10.000000
RABBITWIUP	COST	289.000000
RABBITWIUP	IRON	2.400000
RABBITWIUP	KCALORIES	204.700000
RABBITWIUP	NIACIN	5.500000
RABBITWIUP	PHOSPHORUS	172.000000
RABBITWIUP	PROTEIN	20.900000
RABBITWIUP	RIBOFLAVIN	0.370000
RABBITWIUP	THIAMIN	0.150000
RABBITWIUP	VITAMIN_A	1101.000000
RACCOOFAFL	ASCORBIC	1.500000
RACCOOFAFL	AVAILABLE	0.150005
RACCOOFAFL	CALCIUM	9.000000
RACCOOFAFL	COST	277.000000
RACCOOFAFL	IRON	2.200000
RACCOOFAFL	KCALORIES	441.370000
RACCOOFAFL	NIACIN	5.050000
RACCOOFAFL	PHOSPHORUS	158.000000
RACCOOFAFL	PROTEIN	13.800000
RACCOOFAFL	RIBOFLAVIN	0.310000
RACCOOFAFL	THIAMIN	0.500000
RACCOOFAFL	VITAMIN_A	826.000000
RACCOOSPFL	ASCORBIC	1.500000
RACCOOSPFL	AVAILABLE	0.090005
RACCOOSPFL	CALCIUM	9.000000
RACCOOSPFL	COST	395.000000
RACCOOSPFL	IRON	3.700000
RACCOOSPFL	KCALORIES	134.290000
RACCOOSPFL	NIACIN	8.430000
RACCOOSPFL	PHOSPHORUS	264.000000
RACCOOSPFL	PROTEIN	23.000000
RACCOOSPFL	RIBOFLAVIN	0.490000
RACCOOSPFL	THIAMIN	0.830000
RACCOOSPFL	VITAMIN_A	826.000000
RACCOOWIFL	ASCORBIC	1.500000
RACCOOWIFL	AVAILABLE	0.120000
RACCOOWIFL	CALCIUM	11.000000
RACCOOWIFL	COST	430.000000
RACCOOWIFL	IRON	2.800000
RACCOOWIFL	KCALORIES	326.430000
RACCOOWIFL	NIACIN	6.310000
RACCOOWIFL	PHOSPHORUS	198.000000
RACCOOWIFL	PROTEIN	17.300000
RACCOOWIFL	RIBOFLAVIN	0.370000
RACCOOWIFL	THIAMIN	0.620000
RACCOOWIFL	VITAMIN_A	826.000000
SNAPPISPRI	ASCORBIC	2.000000
SNAPPISPRI	AVAILABLE	0.017960

SNAPPISPRI	CALCIUM	107.000000
SNAPPISPRI	COST	179.000000
SNAPPISPRI	IRON	2.000000
SNAPPISPRI	KCALORIES	69.270000
SNAPPISPRI	NIACIN	7.000000
SNAPPISPRI	PHOSPHORUS	220.000000
SNAPPISPRI	PROTEIN	15.800000
SNAPPISPRI	RIBOFLAVIN	0.710000
SNAPPISPRI	THIAMIN	0.220000
SNAPPISPRI	VITAMIN_A	19.000000
SOFTSHSPRI	ASCORBIC	1.700000
SOFTSHSPRI	AVAILABLE	0.015925
SOFTSHSPRI	CALCIUM	107.000000
SOFTSHSPRI	COST	274.000000
SOFTSHSPRI	IRON	1.500000
SOFTSHSPRI	KCALORIES	81.940000
SOFTSHSPRI	NIACIN	2.600000
SOFTSHSPRI	PHOSPHORUS	146.000000
SOFTSHSPRI	PROTEIN	17.500000
SOFTSHSPRI	RIBOFLAVIN	0.710000
SOFTSHSPRI	THIAMIN	0.250000
SOFTSHSPRI	VITAMIN_A	1652.000000
SQUIRRFABL	ASCORBIC	1.100000
SQUIRRFABL	AVAILABLE	0.213215
SQUIRRFABL	CALCIUM	13.000000
SQUIRRFABL	COST	577.000000
SQUIRRFABL	IRON	1.100000
SQUIRRFABL	KCALORIES	444.170000
SQUIRRFABL	NIACIN	2.320000
SQUIRRFABL	PHOSPHORUS	116.000000
SQUIRRFABL	PROTEIN	15.300000
SQUIRRFABL	RIBOFLAVIN	0.260000
SQUIRRFABL	THIAMIN	0.040000
SQUIRRFABL	VITAMIN_A	1101.000000
SQUIRRFAFL	ASCORBIC	1.100000
SQUIRRFAFL	AVAILABLE	0.056565
SQUIRRFAFL	CALCIUM	13.000000
SQUIRRFAFL	COST	577.000000
SQUIRRFAFL	IRON	1.100000
SQUIRRFAFL	KCALORIES	444.170000
SQUIRRFAFL	NIACIN	2.320000
SQUIRRFAFL	PHOSPHORUS	116.000000
SQUIRRFAFL	PROTEIN	15.300000
SQUIRRFAFL	RIBOFLAVIN	0.260000
SQUIRRFAFL	THIAMIN	0.040000
SQUIRRFAFL	VITAMIN_A	1101.000000
SQUIRRFAUP	ASCORBIC	1.100000
SQUIRRFAUP	AVAILABLE	0.204900
SQUIRRFAUP	CALCIUM	13.000000
SQUIRRFAUP	COST	577.000000
SQUIRRFAUP	IRON	1.100000
SQUIRRFAUP	KCALORIES	444.170000
SQUIRRFAUP	NIACIN	2.320000
SQUIRRFAUP	PHOSPHORUS	116.000000
SQUIRRFAUP	PROTEIN	15.300000
SQUIRRFAUP	RIBOFLAVIN	0.260000
SQUIRRFAUP	THIAMIN	0.040000
SQUIRRFAUP	VITAMIN_A	1101.000000
SQUIRRSPBL	ASCORBIC	1.100000
SQUIRRSPBL	AVAILABLE	0.123515
SQUIRRSPBL	CALCIUM	23.000000
SQUIRRSPBL	COST	1176.000000
SQUIRRSPBL	IRON	1.900000
SQUIRRSPBL	KCALORIES	112.660000
SQUIRRSPBL	NIACIN	4.000000
SQUIRRSPBL	PHOSPHORUS	200.000000
SQUIRRSPBL	PROTEIN	26.300000
SQUIRRSPBL	RIBOFLAVIN	0.350000
SQUIRRSPBL	THIAMIN	0.070000

SQUIRRSPBL	VITAMIN_A	1101.000000
SQUIRRSPFL	ASCORBIC	1.100000
SQUIRRSPFL	AVAILABLE	0.032765
SQUIRRSPFL	CALCIUM	23.000000
SQUIRRSPFL	COST	1176.000000
SQUIRRSPFL	IRON	1.900000
SQUIRRSPFL	KCALORIES	112.660000
SQUIRRSPFL	NIACIN	4.000000
SQUIRRSPFL	PHOSPHORUS	200.000000
SQUIRRSPFL	PROTEIN	26.300000
SQUIRRSPFL	RIBOFLAVIN	0.350000
SQUIRRSPFL	THIAMIN	0.070000
SQUIRRSPFL	VITAMIN_A	1101.000000
SQUIRRSPUP	ASCORBIC	1.100000
SQUIRRSPUP	AVAILABLE	0.118700
SQUIRRSPUP	CALCIUM	23.000000
SQUIRRSPUP	COST	1176.000000
SQUIRRSPUP	IRON	1.900000
SQUIRRSPUP	KCALORIES	112.660000
SQUIRRSPUP	NIACIN	4.000000
SQUIRRSPUP	PHOSPHORUS	200.000000
SQUIRRSPUP	PROTEIN	26.300000
SQUIRRSPUP	RIBOFLAVIN	0.350000
SQUIRRSPUP	THIAMIN	0.070000
SQUIRRSPUP	VITAMIN_A	1101.000000
SQUIRRWIBL	ASCORBIC	1.100000
SQUIRRWIBL	AVAILABLE	0.182340
SQUIRRWIBL	CALCIUM	17.000000
SQUIRRWIBL	COST	704.000000
SQUIRRWIBL	IRON	1.400000
SQUIRRWIBL	KCALORIES	336.250000
SQUIRRWIBL	NIACIN	2.960000
SQUIRRWIBL	PHOSPHORUS	148.000000
SQUIRRWIBL	PROTEIN	19.600000
SQUIRRWIBL	RIBOFLAVIN	0.300000
SQUIRRWIBL	THIAMIN	0.050000
SQUIRRWIBL	VITAMIN_A	1101.000000
SQUIRRWIFL	ASCORBIC	1.100000
SQUIRRWIFL	AVAILABLE	0.048375
SQUIRRWIFL	CALCIUM	17.000000
SQUIRRWIFL	COST	704.000000
SQUIRRWIFL	IRON	1.400000
SQUIRRWIFL	KCALORIES	336.250000
SQUIRRWIFL	NIACIN	2.960000
SQUIRRWIFL	PHOSPHORUS	148.000000
SQUIRRWIFL	PROTEIN	19.600000
SQUIRRWIFL	RIBOFLAVIN	0.300000
SQUIRRWIFL	THIAMIN	0.050000
SQUIRRWIFL	VITAMIN_A	1101.000000
SQUIRRWIUP	ASCORBIC	1.100000
SQUIRRWIUP	AVAILABLE	0.175230
SQUIRRWIUP	CALCIUM	17.000000
SQUIRRWIUP	COST	704.000000
SQUIRRWIUP	IRON	1.400000
SQUIRRWIUP	KCALORIES	336.250000
SQUIRRWIUP	NIACIN	2.960000
SQUIRRWIUP	PHOSPHORUS	148.000000
SQUIRRWIUP	PROTEIN	19.600000
SQUIRRWIUP	RIBOFLAVIN	0.300000
SQUIRRWIUP	THIAMIN	0.050000
SQUIRRWIUP	VITAMIN_A	1101.000000
SUNFLOFAFL	ASCORBIC	0.000000
SUNFLOFAFL	AVAILABLE	454.850550
SUNFLOFAFL	CALCIUM	116.000000
SUNFLOFAFL	COST	417.560000
SUNFLOFAFL	IRON	6.770000
SUNFLOFAFL	KCALORIES	570.000000
SUNFLOFAFL	NIACIN	4.500000
SUNFLOFAFL	PHOSPHORUS	705.000000

SUNFLOFAFL	PROTEIN	22.780000
SUNFLOFAFL	RIBOFLAVIN	0.250000
SUNFLOFAFL	THIAMIN	2.290000
SUNFLOFAFL	VITAMIN_A	50.000000
TERRAPSPRI	ASCORBIC	1.700000
TERRAPSPRI	AVAILABLE	0.423050
TERRAPSPRI	CALCIUM	107.000000
TERRAPSPRI	COST	165.000000
TERRAPSPRI	IRON	3.200000
TERRAPSPRI	KCALORIES	110.990000
TERRAPSPRI	NIACIN	4.800000
TERRAPSPRI	PHOSPHORUS	183.000000
TERRAPSPRI	PROTEIN	18.600000
TERRAPSPRI	RIBOFLAVIN	0.690000
TERRAPSPRI	THIAMIN	0.240000
TERRAPSPRI	VITAMIN_A	1652.000000
TUBERFAFL	ASCORBIC	4.000000
TUBERFAFL	AVAILABLE	2.824660
TUBERFAFL	CALCIUM	14.000000
TUBERFAFL	COST	85.000000
TUBERFAFL	IRON	3.400000
TUBERFAFL	KCALORIES	69.900000
TUBERFAFL	NIACIN	1.300000
TUBERFAFL	PHOSPHORUS	78.000000
TUBERFAFL	PROTEIN	2.300000
TUBERFAFL	RIBOFLAVIN	0.060000
TUBERFAFL	THIAMIN	0.200000
TUBERFAFL	VITAMIN_A	20.000000
TUBERSPFL	ASCORBIC	4.000000
TUBERSPFL	AVAILABLE	2.720080
TUBERSPFL	CALCIUM	14.000000
TUBERSPFL	COST	50.000000
TUBERSPFL	IRON	3.400000
TUBERSPFL	KCALORIES	69.900000
TUBERSPFL	NIACIN	1.300000
TUBERSPFL	PHOSPHORUS	78.000000
TUBERSPFL	PROTEIN	2.300000
TUBERSPFL	RIBOFLAVIN	0.060000
TUBERSPFL	THIAMIN	0.200000
TUBERSPFL	VITAMIN_A	20.000000
TUBERWIFL	ASCORBIC	4.000000
TUBERWIFL	AVAILABLE	1.778610
TUBERWIFL	CALCIUM	14.000000
TUBERWIFL	COST	85.000000
TUBERWIFL	IRON	3.400000
TUBERWIFL	KCALORIES	69.900000
TUBERWIFL	NIACIN	1.300000
TUBERWIFL	PHOSPHORUS	78.000000
TUBERWIFL	PROTEIN	2.300000
TUBERWIFL	RIBOFLAVIN	0.060000
TUBERWIFL	THIAMIN	0.200000
TUBERWIFL	VITAMIN_A	20.000000
TURKEYFAFL	ASCORBIC	1.800000
TURKEYFAFL	AVAILABLE	0.116845
TURKEYFAFL	CALCIUM	6.000000
TURKEYFAFL	COST	181.000000
TURKEYFAFL	IRON	1.200000
TURKEYFAFL	KCALORIES	342.850000
TURKEYFAFL	NIACIN	6.120000
TURKEYFAFL	PHOSPHORUS	162.000000
TURKEYFAFL	PROTEIN	18.400000
TURKEYFAFL	RIBOFLAVIN	0.130000
TURKEYFAFL	THIAMIN	0.060000
TURKEYFAFL	VITAMIN_A	531.000000
TURKEYFAUP	ASCORBIC	1.800000
TURKEYFAUP	AVAILABLE	0.423270
TURKEYFAUP	CALCIUM	6.000000
TURKEYFAUP	COST	181.000000
TURKEYFAUP	IRON	1.200000

TURKEYFAUP	KCALORIES	342.850000
TURKEYFAUP	NIACIN	6.120000
TURKEYFAUP	PHOSPHORUS	162.000000
TURKEYFAUP	PROTEIN	18.400000
TURKEYFAUP	RIBOFLAVIN	0.130000
TURKEYFAUP	THIAMIN	0.060000
TURKEYFAUP	VITAMIN_A	531.000000
TURKEYSPFL	ASCORBIC	1.800000
TURKEYSPFL	AVAILABLE	0.093810
TURKEYSPFL	CALCIUM	8.000000
TURKEYSPFL	COST	248.000000
TURKEYSPFL	IRON	1.400000
TURKEYSPFL	KCALORIES	226.490000
TURKEYSPFL	NIACIN	7.420000
TURKEYSPFL	PHOSPHORUS	197.000000
TURKEYSPFL	PROTEIN	22.200000
TURKEYSPFL	RIBOFLAVIN	0.160000
TURKEYSPFL	THIAMIN	0.080000
TURKEYSPFL	VITAMIN_A	531.000000
TURKEYSPUP	ASCORBIC	1.800000
TURKEYSPUP	AVAILABLE	0.339830
TURKEYSPUP	CALCIUM	8.000000
TURKEYSPUP	COST	248.000000
TURKEYSPUP	IRON	1.400000
TURKEYSPUP	KCALORIES	226.490000
TURKEYSPUP	NIACIN	7.420000
TURKEYSPUP	PHOSPHORUS	197.000000
TURKEYSPUP	PROTEIN	22.200000
TURKEYSPUP	RIBOFLAVIN	0.160000
TURKEYSPUP	THIAMIN	0.080000
TURKEYSPUP	VITAMIN_A	531.000000
TURKEYWIFL	ASCORBIC	1.800000
TURKEYWIFL	AVAILABLE	0.116845
TURKEYWIFL	CALCIUM	6.000000
TURKEYWIFL	COST	216.000000
TURKEYWIFL	IRON	1.200000
TURKEYWIFL	KCALORIES	342.850000
TURKEYWIFL	NIACIN	6.120000
TURKEYWIFL	PHOSPHORUS	162.000000
TURKEYWIFL	PROTEIN	18.400000
TURKEYWIFL	RIBOFLAVIN	0.130000
TURKEYWIFL	THIAMIN	0.060000
TURKEYWIFL	VITAMIN_A	531.000000
TURKEYWIUP	ASCORBIC	1.800000
TURKEYWIUP	AVAILABLE	0.423270
TURKEYWIUP	CALCIUM	6.000000
TURKEYWIUP	COST	216.000000
TURKEYWIUP	IRON	1.200000
TURKEYWIUP	KCALORIES	342.850000
TURKEYWIUP	NIACIN	6.120000
TURKEYWIUP	PHOSPHORUS	162.000000
TURKEYWIUP	PROTEIN	18.400000
TURKEYWIUP	RIBOFLAVIN	0.130000
TURKEYWIUP	THIAMIN	0.060000
TURKEYWIUP	VITAMIN_A	531.000000
WALNUTFAFL	ASCORBIC	2.000000
WALNUTFAFL	AVAILABLE	137.465940
WALNUTFAFL	CALCIUM	0.000000
WALNUTFAFL	COST	897.000000
WALNUTFAFL	IRON	6.000000
WALNUTFAFL	KCALORIES	627.720000
WALNUTFAFL	NIACIN	0.700000
WALNUTFAFL	PHOSPHORUS	570.000000
WALNUTFAFL	PROTEIN	20.500000
WALNUTFAFL	RIBOFLAVIN	0.110000
WALNUTFAFL	THIAMIN	0.220000
WALNUTFAFL	VITAMIN_A	300.000000
RHS	COST	0
RHS	KCALORIES	1386

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.       _RHS_       PROTEIN                 26.46
.       _RHS_       CALCIUM                541.8
.       _RHS_       PHOSPHORUS             541.8
.       _RHS_       IRON                     8.19
.       _RHS_       VITAMIN_A             1827
.       _RHS_       THIAMIN                  .567
        _RHS_       RIBOFLAVIN               .630
        _RHS_       NIACIN                  7.56
.       _RHS_       ASCORBIC                18.9
PROC LP SPARSEDATA RANGEPRICE;
RUN;
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APPENDIX II

LINEAR PROGRAMMING RESULTS

RESOURCE	COST (hours)	ACTIVITY (100 kg)	AVAILABLE (100 kg)
** MACA-37 FORAGING, FALL SEASON			
BEAR	328	0.000000	0.771460
BEAR	431	0.000000	0.609100
BLUEBERRIES	81	0.000000	0.328390
BOX TURTLE	600	0.000000	1.559210
BITTER ACORNS	**160**	**9.368959**	**476.440420**
DEER	83	0.000000	4.092780
HICKORY	247	0.000000	79.940830
PAWPAW	**12**	**4.597390**	**4.597390**
RABBIT	184	0.000000	1.266180
RABBIT	284	0.000000	0.980850
SQUIRREL	542	0.000000	0.989120
SQUIRREL	1015	0.000000	0.780420
SWEET ACORNS	500	0.000000	1309.272600
TURKEY	146	0.000000	0.980350
TURKEY	305	0.000000	0.593030
VIBURNUM	28	2.388670	2.388670
** Total **		16.355019	1885.590800
** MACA-37 PRE-MAIZE GARDENING, FALL SEASON			
BEAR	328	0.000000	0.771460
BEAR	431	0.000000	0.609100
BLUEBERRIES	81	0.000000	0.328390
BOX TURTLE	600	0.000000	1.559210
BITTER ACORNS	**160**	**9.368959**	**476.440420**
DEER	83	0.000000	4.092780
HICKORY	247	0.000000	79.940830
PAWPAW	**12**	**4.597390**	**4.597390**
RABBIT	184	0.000000	1.266180
RABBIT	284	0.000000	0.980850
SQUIRREL	542	0.000000	0.989120
SQUIRREL	1015	0.000000	0.780420
SWEET ACORNS	500	0.000000	1309.272600
TURKEY	146	0.000000	0.980350
TURKEY	305	0.000000	0.593030
VIBURNUM	**28**	**2.388670**	**2.388670**
** Total **		16.355019	1885.590800
** MACA-37 POST-MAIZE GARDENING, FALL SEASON			
BEAR	328	0.000000	0.771460
BEAR	431	0.000000	0.609100
BLUEBERRIES	81	0.000000	0.328390
BOX TURTLE	600	0.000000	1.559210
BITTER ACORNS	**160**	**9.368959**	**476.440420**
DEER	83	0.000000	4.092780
HICKORY	247	0.000000	79.940830
PAWPAW	**12**	**4.597390**	**4.597390**
RABBIT	184	0.000000	1.266180

RABBIT	284	0.000000	0.980850
SQUIRREL	542	0.000000	0.989120
SQUIRREL	1015	0.000000	0.780420
SWEET ACORNS	500	0.000000	1309.272600
TURKEY	146	0.000000	0.980350
TURKEY	305	0.000000	0.593030
VIBURNUM	**28**	**2.388670**	**2.388670**
** Total **		16.355019	1885.590800

** MACA-37 FORAGING, SPRING SEASON **INFEASABLE**

BEAR	440	0.576600	0.576600
BEAR	239	0.674060	0.674060
BOX TURTLE	600	1.559210	1.559210
DEER	160	3.762370	3.762370
MUSHROOM	110	3.028750	3.028750
POKEGREENS	44	1.175620	1.175620
RABBIT	269	0.980850	0.980850
RABBIT	289	1.266180	1.266180
SQUIRREL	1176	0.573000	0.573000
SQUIRREL	704	0.845890	0.845890
TURKEY	248	0.787080	0.787080
TURKEY	216	0.980350	0.980350
** Total **		16.209960	16.209960

** MACA-37 PRE-MAIZE GARDENING, SPRING SEASON **INFEASABLE**

BEAR	440	0.576600	0.576600
BEAR	239	0.674060	0.674060
BOX TURTLE	600	1.559210	1.559210
DEER	160	3.762370	3.762370
MUSHROOM	110	3.028750	3.028750
POKEGREENS	44	1.175620	1.175620
RABBIT	269	0.980850	0.980850
RABBIT	289	1.266180	1.266180
SQUIRREL	1176	0.573000	0.573000
SQUIRREL	704	0.845890	0.845890
TURKEY	248	0.787080	0.787080
TURKEY	216	0.980350	0.980350
** Total **		16.209960	16.209960

** MACA-37 POST-MAIZE GARDENING, SPRING SEASON **INFEASABLE**

BEAR	440	0.576600	0.576600
BEAR	239	0.674060	0.674060
BOX TURTLE	600	1.559210	1.559210
DEER	160	3.762370	3.762370
MUSHROOM	110	3.028750	3.028750
POKEGREENS	44	1.175620	1.175620
RABBIT	269	0.980850	0.980850
RABBIT	289	1.266180	1.266180
SQUIRREL	1176	0.573000	0.573000
SQUIRREL	704	0.845890	0.845890
TURKEY	248	0.787080	0.787080
TURKEY	216	0.980350	0.980350

** Total **		16.209960	16.209960

** MACA-37 FORAGING, SUMMER SEASON **INFEASABLE**

BEAR	475	0.576600	0.576600
BEAR	416	0.609100	0.609100
BLUEBERRIES	65	0.328390	0.328390
BOX TURTLE	600	1.559210	1.559210
RABBIT	304	0.980850	0.980850
RABBIT	269	0.980850	0.980850
SQUIRREL	1211	0.573000	0.573000
SQUIRREL	1000	0.780420	0.780420
TURKEY	283	0.787080	0.787080
TURKEY	290	0.593030	0.593030
** Total **		7.768530	7.768530

** MACA-37 PRE-MAIZE GARDENING, SUMMER SEASON **INFEASABLE**

BEAR	475	0.576600	0.576600
BEAR	416	0.609100	0.609100
BLUEBERRIES	65	0.328390	0.328390
BOX TURTLE	600	1.559210	1.559210
RABBIT	304	0.980850	0.980850
RABBIT	269	0.980850	0.980850
SQUIRREL	1211	0.573000	0.573000
SQUIRREL	1000	0.780420	0.780420
TURKEY	283	0.787080	0.787080
TURKEY	290	0.593030	0.593030
** Total **		7.768530	7.768530

** MACA-37 POST-MAIZE GARDENING, SUMMER SEASON **INFEASABLE**

BEAR	475	0.576600	0.576600
BEAR	416	0.609100	0.609100
BLUEBERRIES	65	0.328390	0.328390
BOX TURTLE	600	1.559210	1.559210
RABBIT	304	0.980850	0.980850
RABBIT	269	0.980850	0.980850
SQUIRREL	1211	0.573000	0.573000
SQUIRREL	1000	0.780420	0.780420
TURKEY	283	0.787080	0.787080
TURKEY	290	0.593030	0.593030
** Total **		7.768530	7.768530

** MACA-37 FORAGING, WINTER SEASON

BEAR	363	0.000000	0.771460
BEAR	169	0.000000	0.674060
BITTER ACORNS	**170**	**10.124552**	**476.440420**
DEER	118	0.000000	4.092780
DEER	**90**	**0.224648**	**3.762370**
HICKORY	277	0.000000	79.940830
RABBIT	219	0.000000	2.532360
SQUIRREL	577	0.000000	0.989120

SQUIRREL	634	0.000000	0.845890
SWEET ACORNS	510	0.000000	1309.272600
TURKEY	181	0.000000	0.980350
TURKEY	146	0.000000	0.980350
VIBURNUM	**46**	**2.388670**	**2.388670**
** Total **		12.737870	1883.671260

** MACA-37 PRE-MAIZE GARDENING, WINTER SEASON

BEAR	363	0.000000	0.771460
BEAR	169	0.000000	0.674060
BITTER ACORNS	**170**	**10.124552**	**476.440420**
DEER	118	0.000000	4.092780
DEER	**90**	**0.224648**	**3.762370**
HICKORY	277	0.000000	79.940830
RABBIT	219	0.000000	2.532360
SQUIRREL	577	0.000000	0.989120
SQUIRREL	634	0.000000	0.845890
SWEET ACORNS	510	0.000000	1309.272600
TURKEY	181	0.000000	0.980350
TURKEY	146	0.000000	0.980350
VIBURNUM	**46**	**2.388670**	**2.388670**
** Total **		12.737870	1883.671260

** MACA-37 POST-MAIZE GARDENING, WINTER SEASON

BEAR	363	0.000000	0.771460
BEAR	169	0.000000	0.674060
BITTER ACORNS	**170**	**10.124552**	**476.440420**
DEER	118	0.000000	4.092780
DEER	**90**	**0.224648**	**3.762370**
HICKORY	277	0.000000	79.940830
RABBIT	219	0.000000	2.532360
SQUIRREL	577	0.000000	0.989120
SQUIRREL	634	0.000000	0.845890
SWEET ACORNS	510	0.000000	1309.272600
TURKEY	181	0.000000	0.980350
TURKEY	146	0.000000	0.980350
VIBURNUM	**46**	**2.388670**	**2.388670**
** Total **		12.737870	1883.671260

** MACA-43 FORAGING, FALL SEASON

BEAR	328	0.000000	0.750950
BEAR	431	0.000000	0.592900
BEAVER	170	0.000000	0.036440
BEAVER	205	0.000000	0.036440
BERRIES (RUBUS)	81	0.000000	0.053960
BLACKCHERRY	74	0.000000	53.955000
BLUEBERRIES	81	0.000000	0.259930
BOX TURTLE	600	0.000000	1.517750
BITTER ACORNS	160	0.000000	466.746040
CHENOPODIUM SEEDS	153	0.000000	431.791070
DEER	**83**	**1.242996**	**4.061970**

DEER	111	0.000000	0.615820
DUCK	4178	0.000000	0.234990
FISH	**28**	**4.732773**	**40.629770**
FISH	63	0.000000	40.629770
GRAPE	46	0.000000	0.346550
HAWTHORN	65	0.000000	0.053960
HAZELNUT	1277	0.000000	0.181610
HICKORY	247	0.000000	79.339040
MUSKRAT	480	0.000000	2.008330
MUSKRAT	543	0.000000	2.008330
MUSSEL	**40**	**0.558614**	**77.385560**
OPOSSUM	184	0.000000	0.083300
OPOSSUM	284	0.000000	0.083300
PAWPAW	**12**	**3.638950**	**3.638950**
PLUM	28	0.000000	0.755370
RABBIT	184	0.000000	1.232510
RABBIT	284	0.000000	0.954770
RACCOON	242	0.000000	0.224200
RACCOON	398	0.000000	0.141040
SNAPPING TURTLE	179	0.000000	0.023760
SOFTSHELL TURTLE	274	0.000000	0.021070
SQUIRREL	542	0.000000	0.962820
SQUIRREL	1015	0.000000	0.759680
SWEET ACORNS	500	0.000000	1279.696770
TERRAPIN	165	0.000000	0.559700
TUBER	60	0.000000	4.221820
TUBER	85	0.000000	0.781920
TURKEY	146	0.000000	1.147610
TURKEY	305	0.000000	0.694210
VIBURNUM	28	0.000000	1.890690
WALNUT	887	0.000000	102.730320
** Total **		10.173333	2603.839990

** MACA-43 PRE-MAIZE GARDENING, FALL SEASON

BEAR	328	0.000000	0.750950
BEAR	431	0.000000	0.592900
BEAVER	170	0.000000	0.036440
BEAVER	205	0.000000	0.036440
BERRIES (RUBUS)	81	0.000000	0.053960
BLACKCHERRY	74	0.000000	53.955000
BLUEBERRIES	81	0.000000	0.259930
BOX TURTLE	600	0.000000	1.517750
BITTER ACORNS	160	0.000000	466.746040
CHENOPODIUM SEEDS	153	0.000000	431.791070
DEER	**83**	**1.242996**	**4.061970**
DEER	111	0.000000	0.615820
DUCK	4178	0.000000	0.234990
FISH	**28**	**4.732773**	**40.629770**
FISH	63	0.000000	40.629770
GRAPE	46	0.000000	0.346550
HAWTHORN	65	0.000000	0.053960
HAZELNUT	1277	0.000000	0.181610
HICKORY	247	0.000000	79.339040
MUSKRAT	480	0.000000	2.008330
MUSKRAT	543	0.000000	2.008330
MUSSEL	**40**	**0.558614**	**77.385560**
OPOSSUM	184	0.000000	0.083300
OPOSSUM	284	0.000000	0.083300

PAWPAW	**12**	**3.638950**	**3.638950**
PLUM	28	0.000000	0.755370
RABBIT	184	0.000000	1.232510
RABBIT	284	0.000000	0.954770
RACCOON	242	0.000000	0.224200
RACCOON	398	0.000000	0.141040
SNAPPING TURTLE	179	0.000000	0.023760
SOFTSHELL TURTLE	274	0.000000	0.021070
SQUIRREL	542	0.000000	0.962820
SQUIRREL	1015	0.000000	0.759680
SWEET ACORNS	500	0.000000	1279.696770
TERRAPIN	165	0.000000	0.559700
TUBER	60	0.000000	4.221820
TUBER	85	0.000000	0.781920
TURKEY	146	0.000000	1.147610
TURKEY	305	0.000000	0.694210
VIBURNUM	28	0.000000	1.890690
WALNUT	887	0.000000	102.730320
** Total **		10.173333	2603.839990

** MACA-43 POST-MAIZE GARDENING, FALL SEASON

BEAR	328	0.000000	0.750950
BEAR	431	0.000000	0.592900
BEAVER	170	0.000000	0.036440
BEAVER	205	0.000000	0.036440
BERRIES (RUBUS)	81	0.000000	0.053960
BLACKCHERRY	74	0.000000	53.955000
BLUEBERRIES	81	0.000000	0.259930
BOX TURTLE	600	0.000000	1.517750
BITTER ACORNS	160	0.000000	466.746040
CHENOPODIUM SEEDS	153	0.000000	431.791070
DEER	**83**	**1.242996**	**4.061970**
DEER	111	0.000000	0.615820
DUCK	4178	0.000000	0.234990
FISH	**28**	**4.732773**	**40.629770**
FISH	63	0.000000	40.629770
GRAPE	46	0.000000	0.346550
HAWTHORN	65	0.000000	0.053960
HAZELNUT	1277	0.000000	0.181610
HICKORY	247	0.000000	79.339040
MAIZE	83.7	0.000000	1695.179770
MUSKRAT	480	0.000000	2.008330
MUSKRAT	543	0.000000	2.008330
MUSSEL	**40**	**0.558614**	**77.385560**
OPOSSUM	184	0.000000	0.083300
OPOSSUM	284	0.000000	0.083300
PAWPAW	**12**	**3.638950**	**3.638950**
PLUM	28	0.000000	0.755370
RABBIT	184	0.000000	1.232510
RABBIT	284	0.000000	0.954770
RACCOON	242	0.000000	0.224200
RACCOON	398	0.000000	0.141040
SNAPPING TURTLE	179	0.000000	0.023760
SOFTSHELL TURTLE	274	0.000000	0.021070
SQUIRREL	542	0.000000	0.962820
SQUIRREL	1015	0.000000	0.759680
SWEET ACORNS	500	0.000000	1279.696770
TERRAPIN	165	0.000000	0.559700

TUBER	60	0.000000	4.221820
TUBER	85	0.000000	0.781920
TURKEY	146	0.000000	1.147610
TURKEY	305	0.000000	0.694210
VIBURNUM	28	0.000000	1.890690
WALNUT	887	0.000000	102.730320
** Total **		10.173333	4299.019760

** MACA-43 FORAGING, SPRING SEASON

AMARANTH GREENS	**44**	**0.447232**	**2.828000**
BEAR	440	0.000000	0.561260
BEAR	239	0.000000	0.656140
BEAVER	170	0.000000	0.036440
BEAVER	205	0.000000	0.036440
BOX TURTLE	600	0.000000	1.517750
CHENOPODIUM GREENS	**44**	**0.588760**	**0.588760**
DEER	97	0.000000	0.607770
DEER	160	0.000000	3.734050
DUCK	4178	0.000000	0.234990
FISH	**28**	**8.588686**	**40.629770**
GREENS (OTHER)	100	0.000000	0.772640
MUSHROOM	110	0.000000	3.005950
MUSKRAT	480	0.000000	2.008330
MUSKRAT	543	0.000000	2.008330
OPOSSUM	269	0.000000	0.083300
OPOSSUM	289	0.000000	0.083300
POKEGREENS	**44**	**0.930530**	**0.930530**
RABBIT	269	0.000000	0.954770
RABBIT	289	0.000000	1.232510
RACCOON	395	0.000000	0.134520
RACCOON	430	0.000000	0.179360
SNAPPING TURTLE	179	0.000000	0.023760
SOFTSHELL TURTLE	274	0.000000	0.021070
SQUIRREL	1176	0.000000	0.557750
SQUIRREL	704	0.000000	0.823400
TERRAPIN	165	0.000000	0.559700
TUBER	60	0.000000	4.065510
TUBER	85	0.000000	2.658360
TURKEY	248	0.000000	0.921370
TURKEY	216	0.000000	1.147610
** Total **		10.555208	73.603440

** MACA-43 PRE-MAIZE GARDENING, SPRING SEASON

AMARANTH GREENS	**44**	**0.447232**	**2.828000**
BEAR	440	0.000000	0.561260
BEAR	239	0.000000	0.656140
BEAVER	170	0.000000	0.036440
BEAVER	205	0.000000	0.036440
BOX TURTLE	600	0.000000	1.517750
CHENOPODIUM GREENS	**44**	**0.588760**	**0.588760**
DEER	97	0.000000	0.607770
DEER	160	0.000000	3.734050
DUCK	4178	0.000000	0.234990
FISH	**28**	**8.588686**	**40.629770**
GREENS (OTHER)	100	0.000000	0.772640

MUSHROOM	110	0.000000	3.005950
MUSKRAT	480	0.000000	2.008330
MUSKRAT	543	0.000000	2.008330
OPOSSUM	269	0.000000	0.083300
OPOSSUM	289	0.000000	0.083300
POKEGREENS	**44**	**0.930530**	**0.930530**
RABBIT	269	0.000000	0.954770
RABBIT	289	0.000000	1.232510
RACCOON	395	0.000000	0.134520
RACCOON	430	0.000000	0.179360
SNAPPING TURTLE	179	0.000000	0.023760
SOFTSHELL TURTLE	274	0.000000	0.021070
SQUIRREL	1176	0.000000	0.557750
SQUIRREL	704	0.000000	0.823400
TERRAPIN	165	0.000000	0.559700
TUBER	60	0.000000	4.065510
TUBER	85	0.000000	2.658360
TURKEY	248	0.000000	0.921370
TURKEY	216	0.000000	1.147610
** Total **		10.555208	73.603440

** MACA-43 POST-MAIZE GARDENING, SPRING SEASON

AMARANTH GREENS	**44**	**1.035992**	**2.828000**
BEAR	440	0.000000	0.561260
BEAR	239	0.000000	0.656140
BEAVER	170	0.000000	0.036440
BEAVER	205	0.000000	0.036440
BOX TURTLE	600	0.000000	1.517750
CHENOPODIUM GREENS	**44**	**0.000000**	**0.588760**
DEER	97	0.000000	0.607770
DEER	160	0.000000	3.734050
DUCK	4178	0.000000	0.234990
FISH	**28**	**8.588686**	**40.629770**
GREENS (OTHER)	100	0.000000	0.772640
MUSHROOM	110	0.000000	3.005950
MUSKRAT	480	0.000000	2.008330
MUSKRAT	543	0.000000	2.008330
OPOSSUM	269	0.000000	0.083300
OPOSSUM	289	0.000000	0.083300
POKEGREENS	**44**	**0.930530**	**0.930530**
RABBIT	269	0.000000	0.954770
RABBIT	289	0.000000	1.232510
RACCOON	395	0.000000	0.134520
RACCOON	430	0.000000	0.179360
SNAPPING TURTLE	179	0.000000	0.023760
SOFTSHELL TURTLE	274	0.000000	0.021070
SQUIRREL	1176	0.000000	0.557750
SQUIRREL	704	0.000000	0.823400
TERRAPIN	165	0.000000	0.559700
TUBER	60	0.000000	4.065510
TUBER	85	0.000000	2.658360
TURKEY	248	0.000000	0.921370
TURKEY	216	0.000000	1.147610
** Total **		10.555208	73.603440

** MACA-43 FORAGING, SUMMER SEASON

AMARANTH GREENS	**44**	**0.185836**	**2.828000**
BEAR	475	0.000000	0.561260
BEAR	416	0.000000	0.592900
BEAVER	205	0.000000	0.036440
BEAVER	170	0.000000	0.036440
BERRIES (RUBUS)	65	0.000000	0.053960
BLACKCHERRY	60	0.000000	53.955000
BLUEBERRIES	65	0.000000	0.259930
BOX TURTLE	600	0.000000	1.517750
CHENOPODIUM GREENS	44	0.000000	0.588760
DEER	132	0.000000	0.607770
DEER	96	0.000000	0.615820
DUCK	4178	0.000000	0.234990
FISH	63	0.000000	40.629770
FISH	**28**	**8.770240**	**40.629770**
GRAPE	28	0.000000	0.346550
GREENS (OTHER)	100	0.000000	0.386320
MUSKRAT	543	0.000000	2.008330
MUSKRAT	480	0.000000	2.008330
MUSSEL	**40**	**0.439315**	**77.385560**
OPOSSUM	304	0.000000	0.083300
OPOSSUM	269	0.000000	0.083300
RABBIT	304	0.000000	0.954770
RABBIT	269	0.000000	0.954770
RACCOON	430	0.000000	0.134520
RACCOON	378	0.000000	0.141040
SNAPPING TURTLE	179	0.000000	0.023760
SOFTSHELL TURTLE	274	0.000000	0.021070
SQUIRREL	1211	0.000000	0.557750
SQUIRREL	1000	0.000000	0.759680
TERRAPIN	165	0.000000	0.559700
TUBER	85	0.000000	4.065510
TUBER	60	0.000000	0.781920
TURKEY	283	0.000000	0.921370
TURKEY	290	0.000000	0.694210
** Total **		9.395391	236.020320

** MACA-43 PRE-MAIZE GARDENING, SUMMER SEASON

AMARANTH GREENS	44	0.000000	2.828000
BEAR	475	0.000000	0.561260
BEAR	416	0.000000	0.592900
BEAVER	205	0.000000	0.036440
BEAVER	170	0.000000	0.036440
BERRIES (RUBUS)	65	0.000000	0.053960
BLACKCHERRY	60	0.000000	53.955000
BLUEBERRIES	65	0.000000	0.259930
BOX TURTLE	600	0.000000	1.517750
CHENOPODIUM GREENS	44	0.000000	0.588760
DEER	132	0.000000	0.607770
DEER	96	0.000000	0.615820
DUCK	4178	0.000000	0.234990
FISH	63	0.000000	40.629770
FISH	28	0.000000	40.629770
GRAPE	28	0.000000	0.346550
GREENS (OTHER)	100	0.000000	0.386320
MUSKRAT	543	0.000000	2.008330
MUSKRAT	480	0.000000	2.008330
MUSSEL	40	0.000000	77.385560

OPOSSUM	304	0.000000	0.083300
OPOSSUM	269	0.000000	0.083300
RABBIT	304	0.000000	0.954770
RABBIT	269	0.000000	0.954770
RACCOON	430	0.000000	0.134520
RACCOON	378	0.000000	0.141040
SNAPPING TURTLE	179	0.000000	0.023760
SOFTSHELL TURTLE	274	0.000000	0.021070
SQUASH	**13**	**15.599325**	**1695.179770**
SQUIRREL	1211	0.000000	0.557750
SQUIRREL	1000	0.000000	0.759680
TERRAPIN	165	0.000000	0.559700
TUBER	85	0.000000	4.065510
TUBER	60	0.000000	0.781920
TURKEY	283	0.000000	0.921370
TURKEY	290	0.000000	0.694210
** Total **		15.599325	1931.200090

** MACA-43 POST-MAIZE GARDENING, SUMMER SEASON

AMARANTH GREENS	44	0.000000	2.828000
BEAR	475	0.000000	0.561260
BEAR	416	0.000000	0.592900
BEAVER	205	0.000000	0.036440
BEAVER	170	0.000000	0.036440
BERRIES (RUBUS)	65	0.000000	0.053960
BLACKCHERRY	60	0.000000	53.955000
BLUEBERRIES	65	0.000000	0.259930
BOX TURTLE	600	0.000000	1.517750
CHENOPODIUM GREENS	44	0.000000	0.588760
DEER	132	0.000000	0.607770
DEER	96	0.000000	0.615820
DUCK	4178	0.000000	0.234990
FISH	63	0.000000	40.629770
FISH	28	0.000000	40.629770
GRAPE	28	0.000000	0.346550
GREENS (OTHER)	100	0.000000	0.386320
MAIZE	71.1	0.000000	1695.179770
MUSKRAT	543	0.000000	2.008330
MUSKRAT	480	0.000000	2.008330
MUSSEL	40	0.000000	77.385560
OPOSSUM	304	0.000000	0.083300
OPOSSUM	269	0.000000	0.083300
RABBIT	304	0.000000	0.954770
RABBIT	269	0.000000	0.954770
RACCOON	430	0.000000	0.134520
RACCOON	378	0.000000	0.141040
SNAPPING TURTLE	179	0.000000	0.023760
SOFTSHELL TURTLE	274	0.000000	0.021070
SQUASH	**13**	**15.599325**	**1695.179770**
SQUIRREL	1211	0.000000	0.557750
SQUIRREL	1000	0.000000	0.759680
TERRAPIN	165	0.000000	0.559700
TUBER	85	0.000000	4.065510
TUBER	60	0.000000	0.781920
TURKEY	283	0.000000	0.921370
TURKEY	290	0.000000	0.694210
** Total **		15.599325	3626.379860

** MACA-43 FORAGING, WINTER SEASON

BEAR	363	0.000000	0.750950
BEAR	169	0.000000	0.656140
BEAVER	205	0.000000	0.036440
BEAVER	170	0.000000	0.036440
BITTER ACORNS	170	0.000000	466.746040
CHENOPODIUM SEEDS	**163**	**3.717804**	**431.791070**
DEER	118	0.000000	4.061970
DEER	**90**	**0.302560**	**3.734050**
DUCK	4178	0.000000	0.234990
FISH	63	0.000000	40.629770
HAWTHORN	**81**	**0.053960**	**0.053960**
HAZELNUT	1287	0.000000	0.181610
HICKORY	277	0.000000	79.339040
MUSKRAT	543	0.000000	2.008330
MUSKRAT	480	0.000000	2.008330
OPOSSUM	219	0.000000	0.166600
PLUM	46	0.000000	0.755370
RABBIT	219	0.000000	2.465020
RACCOON	277	0.000000	0.224200
RACCOON	395	0.000000	0.179360
SNAPPING TURTLE	179	0.000000	0.023760
SQUIRREL	577	0.000000	0.962820
SQUIRREL	634	0.000000	0.823400
SWEET ACORNS	510	0.000000	1279.696770
TUBER	85	0.000000	4.221820
TUBER	60	0.000000	2.658360
TURKEY	181	0.000000	1.147610
TURKEY	146	0.000000	1.147610
VIBURNUM	**46**	**1.890690**	**1.890690**
WALNUT	897	0.000000	102.730320
** Total **		5.965014	2431.362840

** MACA-43 PRE-MAIZE GARDENING, WINTER SEASON

BEAR	363	0.000000	0.750950
BEAR	169	0.000000	0.656140
BEAVER	205	0.000000	0.036440
BEAVER	170	0.000000	0.036440
BITTER ACORNS	170	0.000000	466.746040
CHENOPODIUM SEEDS	**163**	**3.950875**	**431.791070**
DEER	118	0.000000	4.061970
DEER	90	0.000000	3.734050
DUCK	4178	0.000000	0.234990
FISH	63	0.000000	40.629770
HAWTHORN	**81**	**0.053960**	**0.053960**
HAZELNUT	1287	0.000000	0.181610
HICKORY	277	0.000000	79.339040
MUSKRAT	543	0.000000	2.008330
MUSKRAT	480	0.000000	2.008330
OPOSSUM	219	0.000000	0.166600
PLUM	46	0.000000	0.755370
RABBIT	**219**	**0.027259**	**2.465020**
RACCOON	277	0.000000	0.224200
RACCOON	395	0.000000	0.179360
SNAPPING TURTLE	179	0.000000	0.023760
SQUASH	**26**	**0.747049**	**1695.179770**

SQUIRREL	577	0.000000	0.962820
SQUIRREL	634	0.000000	0.823400
SUNFLOWER	418	0.000000	339.916500
SWEET ACORNS	510	0.000000	1279.696770
TUBER	85	0.000000	4.221820
TUBER	60	0.000000	2.658360
TURKEY	181	0.000000	1.147610
TURKEY	146	0.000000	1.147610
VIBURNUM	**46**	**0.791373**	**1.890690**
WALNUT	897	0.000000	102.730320
** Total **		5.570516	4466.459110

** MACA-43 POST-MAIZE GARDENING, WINTER SEASON

BEAR	363	0.000000	0.750950
BEAR	169	0.000000	0.656140
BEAVER	205	0.000000	0.036440
BEAVER	170	0.000000	0.036440
BITTER ACORNS	170	0.000000	466.746040
CHENOPODIUM SEEDS	**163**	**3.950875**	**431.791070**
DEER	118	0.000000	4.061970
DEER	90	0.000000	3.734050
DUCK	4178	0.000000	0.234990
FISH	63	0.000000	40.629770
HAWTHORN	**81**	**0.053960**	**0.053960**
HAZELNUT	1287	0.000000	0.181610
HICKORY	277	0.000000	79.339040
MAIZE	83.7	0.000000	1695.179770
MUSKRAT	543	0.000000	2.008330
MUSKRAT	480	0.000000	2.008330
OPOSSUM	219	0.000000	0.166600
PLUM	46	0.000000	0.755370
RABBIT	**219**	**0.027259**	**2.465020**
RACCOON	277	0.000000	0.224200
RACCOON	395	0.000000	0.179360
SNAPPING TURTLE	179	0.000000	0.023760
SQUASH	**26**	**0.747049**	**1695.179770**
SQUIRREL	577	0.000000	0.962820
SQUIRREL	634	0.000000	0.823400
SUNFLOWER	418	0.000000	339.916500
SWEET ACORNS	510	0.000000	1279.696770
TUBER	85	0.000000	4.221820
TUBER	60	0.000000	2.658360
TURKEY	181	0.000000	1.147610
TURKEY	146	0.000000	1.147610
VIBURNUM	46	0.000000	1.890690
WALNUT	897	0.000000	102.730320
** Total **		4.779143	6161.638880

** MACA-65 FORAGING, FALL SEASON

BEAR	328	0.000000	0.771470
BEAR	431	0.000000	0.609100
BLUEBERRIES	81	0.000000	0.308810
BOX TURTLE	600	0.000000	1.559210
BITTER ACORNS	**160**	**9.512578**	**494.609930**
DEER	83	0.000000	4.357300

HICKORY	247	0.000000	85.107450
PAWPAW	**12**	**4.323340**	**4.323340**
RABBIT	184	0.000000	1.266180
RABBIT	284	0.000000	0.980850
SQUIRREL	542	0.000000	0.989120
SQUIRREL	1015	0.000000	0.780420
SWEET ACORNS	500	0.000000	1354.745330
TURKEY	146	0.000000	1.043710
TURKEY	305	0.000000	0.631360
VIBURNUM	**28**	**2.246280**	**2.246280**
** Total **		16.082198	1954.329860

** MACA-65 PRE-MAIZE GARDENING, FALL SEASON

BEAR	328	0.000000	0.771470
BEAR	431	0.000000	0.609100
BLUEBERRIES	81	0.000000	0.308810
BOX TURTLE	600	0.000000	1.559210
BITTER ACORNS	**160**	**9.512578**	**494.609930**
DEER	83	0.000000	4.357300
HICKORY	247	0.000000	85.107450
PAWPAW	**12**	**4.323340**	**4.323340**
RABBIT	184	0.000000	1.266180
RABBIT	284	0.000000	0.980850
SQUIRREL	542	0.000000	0.989120
SQUIRREL	1015	0.000000	0.780420
SWEET ACORNS	500	0.000000	1354.745330
TURKEY	146	0.000000	1.043710
TURKEY	305	0.000000	0.631360
VIBURNUM	**28**	**2.246280**	**2.246280**
** Total **		16.082198	1954.329860

** MACA-65 POST-MAIZE GARDENING, FALL SEASON

BEAR	328	0.000000	0.771470
BEAR	431	0.000000	0.609100
BLUEBERRIES	81	0.000000	0.308810
BOX TURTLE	600	0.000000	1.559210
BITTER ACORNS	**160**	**9.512578**	**494.609930**
DEER	83	0.000000	4.357300
HICKORY	247	0.000000	85.107450
PAWPAW	**12**	**4.323340**	**4.323340**
RABBIT	184	0.000000	1.266180
RABBIT	284	0.000000	0.980850
SQUIRREL	542	0.000000	0.989120
SQUIRREL	1015	0.000000	0.780420
SWEET ACORNS	500	0.000000	1354.745330
TURKEY	146	0.000000	1.043710
TURKEY	305	0.000000	0.631360
VIBURNUM	**28**	**2.246280**	**2.246280**
** Total **		16.082198	1954.329860

** MACA-65 FORAGING, SPRING SEASON **INFEASABLE**

BEAR	440	0.576600	0.576600

BEAR	239	0.674060	0.674060
BOX TURTLE	600	1.559210	1.559210
DEER	160	4.005540	4.005540
MUSHROOM	110	3.224500	3.224500
POKEGREENS	44	1.105540	1.105540
RABBIT	269	0.980850	0.980850
RABBIT	289	1.266180	1.266180
SQUIRREL	1176	0.573000	0.573000
SQUIRREL	704	0.845890	0.845890
TURKEY	248	0.837950	0.837950
TURKEY	216	1.043710	1.043710
** Total **		16.693030	16.693030

** MACA-65 PRE-MAIZE GARDENING, SPRING SEASON **INFEASABLE**

BEAR	440	0.576600	0.576600
BEAR	239	0.674060	0.674060
BOX TURTLE	600	1.559210	1.559210
DEER	160	4.005540	4.005540
MUSHROOM	110	3.224500	3.224500
POKEGREENS	44	1.105540	1.105540
RABBIT	269	0.980850	0.980850
RABBIT	289	1.266180	1.266180
SQUIRREL	1176	0.573000	0.573000
SQUIRREL	704	0.845890	0.845890
TURKEY	248	0.837950	0.837950
TURKEY	216	1.043710	1.043710
** Total **		16.693030	16.693030

** MACA-65 POST-MAIZE GARDENING, SPRING SEASON **INFEASABLE**

BEAR	440	0.576600	0.576600
BEAR	239	0.674060	0.674060
BOX TURTLE	600	1.559210	1.559210
DEER	160	4.005540	4.005540
MUSHROOM	110	3.224500	3.224500
POKEGREENS	44	1.105540	1.105540
RABBIT	269	0.980850	0.980850
RABBIT	289	1.266180	1.266180
SQUIRREL	1176	0.573000	0.573000
SQUIRREL	704	0.845890	0.845890
TURKEY	248	0.837950	0.837950
TURKEY	216	1.043710	1.043710
** Total **		16.693030	16.693030

** MACA-65 FORAGING, SUMMER SEASON **INFEASABLE**

BEAR	475	0.576600	0.576600
BEAR	416	0.609100	0.609100
BLUEBERRIES	65	0.308810	0.308810
BOX TURTLE	600	1.559210	1.559210
RABBIT	304	0.980850	0.980850
RABBIT	269	0.980850	0.980850
SQUIRREL	1211	0.573000	0.573000
SQUIRREL	1000	0.780420	0.780420

TURKEY	283	0.837950	0.837950
TURKEY	290	0.631360	0.631360
** Total **		7.838150	7.838150

** MACA-65 PRE-MAIZE GARDENING, SUMMER SEASON **INFEASABLE**

BEAR	475	0.576600	0.576600
BEAR	416	0.609100	0.609100
BLUEBERRIES	65	0.308810	0.308810
BOX TURTLE	600	1.559210	1.559210
RABBIT	304	0.980850	0.980850
RABBIT	269	0.980850	0.980850
SQUIRREL	1211	0.573000	0.573000
SQUIRREL	1000	0.780420	0.780420
TURKEY	283	0.837950	0.837950
TURKEY	290	0.631360	0.631360
** Total **		7.838150	7.838150

** MACA-65 POST-MAIZE GARDENING, SUMMER SEASON **INFEASABLE**

BEAR	475	0.576600	0.576600
BEAR	416	0.609100	0.609100
BLUEBERRIES	65	0.308810	0.308810
BOX TURTLE	600	1.559210	1.559210
RABBIT	304	0.980850	0.980850
RABBIT	269	0.980850	0.980850
SQUIRREL	1211	0.573000	0.573000
SQUIRREL	1000	0.780420	0.780420
TURKEY	283	0.837950	0.837950
TURKEY	290	0.631360	0.631360
** Total **		7.838150	7.838150

** MACA-65 FORAGING, WINTER SEASON

BEAR	363	0.000000	0.771470
BEAR	169	0.000000	0.674060
BITTER ACORNS	**170**	**10.219122**	**494.609930**
DEER	118	0.000000	4.357300
DEER	**90**	**0.231747**	**4.005540**
HICKORY	277	0.000000	85.107450
RABBIT	219	0.000000	2.532360
SQUIRREL	577	0.000000	0.989120
SQUIRREL	634	0.000000	0.845890
SWEET ACORNS	510	0.000000	1354.745330
TURKEY	181	0.000000	1.043710
TURKEY	146	0.000000	1.043710
VIBURNUM	**46**	**2.246280**	**2.246280**
** Total **		12.697149	1952.972150

** MACA-65 PRE-MAIZE GARDENING, WINTER SEASON

BEAR	363	0.000000	0.771470
BEAR	169	0.000000	0.674060

BITTER ACORNS	**170**	**10.219122**	**494.609930**
DEER	118	0.000000	4.357300
DEER	**90**	**0.231747**	**4.005540**
HICKORY	277	0.000000	85.107450
RABBIT	219	0.000000	2.532360
SQUIRREL	577	0.000000	0.989120
SQUIRREL	634	0.000000	0.845890
SWEET ACORNS	510	0.000000	1354.745330
TURKEY	181	0.000000	1.043710
TURKEY	146	0.000000	1.043710
VIBURNUM	**46**	**2.246280**	**2.246280**
** Total **		12.697149	1952.972150

** MACA-65 POST-MAIZE GARDENING, WINTER SEASON

BEAR	363	0.000000	0.771470
BEAR	169	0.000000	0.674060
BITTER ACORNS	**170**	**10.219122**	**494.609930**
DEER	118	0.000000	4.357300
DEER	**90**	**0.231747**	**4.005540**
HICKORY	277	0.000000	85.107450
RABBIT	219	0.000000	2.532360
SQUIRREL	577	0.000000	0.989120
SQUIRREL	634	0.000000	0.845890
SWEET ACORNS	510	0.000000	1354.745330
TURKEY	181	0.000000	1.043710
TURKEY	146	0.000000	1.043710
VIBURNUM	**46**	**2.246280**	**2.246280**
** Total **		12.697149	1952.972150

** MACA-89 FORAGING, FALL SEASON

BEAR	328	0.000000	0.771460
BEAR	431	0.000000	0.609100
BLUEBERRIES	81	0.000000	0.189110
BOX TURTLE	600	0.000000	1.559210
BITTER ACORNS	**160**	**10.390791**	**605.715470**
DEER	83	0.000000	5.974820
HICKORY	247	0.000000	116.701070
PAWPAW	**12**	**2.647540**	**2.647540**
RABBIT	184	0.000000	1.266180
RABBIT	284	0.000000	0.980850
SQUIRREL	542	0.000000	0.989120
SQUIRREL	1015	0.000000	0.780430
SWEET ACORNS	500	0.000000	1632.808420
TURKEY	146	0.000000	1.431150
TURKEY	305	0.000000	0.865730
VIBURNUM	**28**	**1.375590**	**1.375590**
** Total **		14.413921	2374.665250

** MACA-89 PRE-MAIZE GARDENING, FALL SEASON

BEAR	328	0.000000	0.771460
BEAR	431	0.000000	0.609100
BLUEBERRIES	81	0.000000	0.189110

BOX TURTLE	600	0.000000	1.559210
BITTER ACORNS	**160**	**10.390791**	**605.715470**
DEER	83	0.000000	5.974820
HICKORY	247	0.000000	116.701070
PAWPAW	**12**	**2.647540**	**2.647540**
RABBIT	184	0.000000	1.266180
RABBIT	284	0.000000	0.980850
SQUIRREL	542	0.000000	0.989120
SQUIRREL	1015	0.000000	0.780430
SWEET ACORNS	**500**	**0.000000**	**1632.808420**
TURKEY	146	0.000000	1.431150
TURKEY	305	0.000000	0.865730
VIBURNUM	28	1.375590	1.375590
** Total **		14.413921	2374.665250

** MACA-89 POST-MAIZE GARDENING, FALL SEASON

BEAR	328	0.000000	0.771460
BEAR	431	0.000000	0.609100
BLUEBERRIES	81	0.000000	0.189110
BOX TURTLE	600	0.000000	1.559210
BITTER ACORNS	**160**	**10.390791**	**605.715470**
DEER	83	0.000000	5.974820
HICKORY	247	0.000000	116.701070
PAWPAW	**12**	**2.647540**	**2.647540**
RABBIT	184	0.000000	1.266180
RABBIT	284	0.000000	0.980850
SQUIRREL	542	0.000000	0.989120
SQUIRREL	1015	0.000000	0.780430
SWEET ACORNS	500	0.000000	1632.808420
TURKEY	146	0.000000	1.431150
TURKEY	305	0.000000	0.865730
VIBURNUM	**28**	**1.375590**	**1.375590**
** Total **		14.413921	2374.665250

** MACA-89 FORAGING, SPRING SEASON **INFEASABLE**

BEAR	440	0.576590	0.576590
BEAR	239	0.674060	0.674060
BOX TURTLE	600	1.559210	1.559210
DEER	160	5.492480	5.492480
MUSHROOM	110	4.421500	4.421500
POKEGREENS	44	0.677010	0.677010
RABBIT	269	0.980850	0.980850
RABBIT	289	1.266180	1.266180
SQUIRREL	1176	0.573000	0.573000
SQUIRREL	704	0.845890	0.845890
TURKEY	248	1.149020	1.149020
TURKEY	216	1.431150	1.431150
** Total **		19.646940	19.646940

** MACA-89 PRE-MAIZE GARDENING, SPRING SEASON **INFEASABLE**

BEAR	440	0.576590	0.576590
BEAR	239	0.674060	0.674060

BOX TURTLE	600	1.559210	1.559210
DEER	160	5.492480	5.492480
MUSHROOM	110	4.421500	4.421500
POKEGREENS	44	0.677010	0.677010
RABBIT	269	0.980850	0.980850
RABBIT	289	1.266180	1.266180
SQUIRREL	1176	0.573000	0.573000
SQUIRREL	704	0.845890	0.845890
TURKEY	248	1.149020	1.149020
TURKEY	216	1.431150	1.431150
** Total **		19.646940	19.646940

** MACA-89 POST-MAIZE GARDENING, SPRING SEASON **INFEASABLE**

BEAR	440	0.576590	0.576590
BEAR	239	0.674060	0.674060
BOX TURTLE	600	1.559210	1.559210
DEER	160	5.492480	5.492480
MUSHROOM	110	4.421500	4.421500
POKEGREENS	44	0.677010	0.677010
RABBIT	269	0.980850	0.980850
RABBIT	289	1.266180	1.266180
SQUIRREL	1176	0.573000	0.573000
SQUIRREL	704	0.845890	0.845890
TURKEY	248	1.149020	1.149020
TURKEY	216	1.431150	1.431150
** Total **		19.646940	19.646940

** MACA-89 FORAGING, SUMMER SEASON **INFEASABLE**

BEAR	475	0.576590	0.576590
BEAR	416	0.609100	0.609100
BLUEBERRIES	65	0.189110	0.189110
BOX TURTLE	600	1.559210	1.559210
RABBIT	304	0.980850	0.980850
RABBIT	269	0.980850	0.980850
SQUIRREL	1211	0.573000	0.573000
SQUIRREL	1000	0.780430	0.780430
TURKEY	283	1.149020	1.149020
TURKEY	290	0.865730	0.865730
** Total **		8.263890	8.263890

** MACA-89 PRE-MAIZE GARDENING, SUMMER SEASON **INFEASABLE**

BEAR	475	0.576590	0.576590
BEAR	416	0.609100	0.609100
BLUEBERRIES	65	0.189110	0.189110
BOX TURTLE	600	1.559210	1.559210
RABBIT	304	0.980850	0.980850
RABBIT	269	0.980850	0.980850
SQUIRREL	1211	0.573000	0.573000
SQUIRREL	1000	0.780430	0.780430
TURKEY	283	1.149020	1.149020
TURKEY	290	0.865730	0.865730

** Total **		8.263890	8.263890

** MACA-89 POST-MAIZE GARDENING, SUMMER SEASON **INFEASABLE**

BEAR	475	0.576590	0.576590
BEAR	416	0.609100	0.609100
BLUEBERRIES	65	0.189110	0.189110
BOX TURTLE	600	1.559210	1.559210
RABBIT	304	0.980850	0.980850
RABBIT	269	0.980850	0.980850
SQUIRREL	1211	0.573000	0.573000
SQUIRREL	1000	0.780430	0.780430
TURKEY	283	1.149020	1.149020
TURKEY	290	0.865730	0.865730
** Total **		8.263890	8.263890

** MACA-89 FORAGING, WINTER SEASON

BEAR	363	0.000000	0.771460
BEAR	169	0.000000	0.674060
BITTER ACORNS	**170**	**10.797397**	**605.715470**
DEER	118	0.000000	5.974820
DEER	**90**	**0.275159**	**5.492480**
HICKORY	277	0.000000	116.701070
RABBIT	219	0.000000	2.532360
SQUIRREL	577	0.000000	0.989120
SQUIRREL	634	0.000000	0.845890
SWEET ACORNS	510	0.000000	1632.808420
TURKEY	181	0.000000	1.431150
TURKEY	146	0.000000	1.431150
VIBURNUM	**46**	**1.375590**	**1.375590**
** Total **		12.448146	2376.743040

** MACA-89 PRE-MAIZE GARDENING, WINTER SEASON

BEAR	363	0.000000	0.771460
BEAR	169	0.000000	0.674060
BITTER ACORNS	**170**	**10.797397**	**605.715470**
DEER	118	0.000000	5.974820
DEER	**90**	**0.275159**	**5.492480**
HICKORY	277	0.000000	116.701070
RABBIT	219	0.000000	2.532360
SQUIRREL	577	0.000000	0.989120
SQUIRREL	634	0.000000	0.845890
SWEET ACORNS	510	0.000000	1632.808420
TURKEY	181	0.000000	1.431150
TURKEY	146	0.000000	1.431150
VIBURNUM	**46**	**1.375590**	**1.375590**
** Total **		12.448146	2376.743040

** MACA-89 POST-MAIZE GARDENING, WINTER SEASON

BEAR	363	0.000000	0.771460
BEAR	169	0.000000	0.674060

BITTER ACORNS	**170**	**10.797397**	**605.715470**
DEER	118	0.000000	5.974820
DEER	**90**	**0.275159**	**5.492480**
HICKORY	277	0.000000	116.701070
RABBIT	219	0.000000	2.532360
SQUIRREL	577	0.000000	0.989120
SQUIRREL	634	0.000000	0.845890
SWEET ACORNS	510	0.000000	1632.808420
TURKEY	181	0.000000	1.431150
TURKEY	146	0.000000	1.431150
VIBURNUM	**46**	**1.375590**	**1.375590**
** Total **		12.448146	2376.743040

** MACA-93 FORAGING, FALL SEASON

BEAR	328	0.000000	0.770320
BEAR	431	0.000000	0.608200
BERRIES (RUBUS)	81	0.000000	0.013180
BLACKCHERRY	74	0.000000	13.180000
BLUEBERRIES	81	0.000000	0.240440
BOX TURTLE	600	0.000000	1.556890
BITTER ACORNS	160	0.000000	544.091400
CHENOPODIUM SEEDS	153	0.000000	105.476900
DEER	**83**	**1.292727**	**5.090380**
DEER	111	0.000000	0.150430
DUCK	4178	0.000000	0.013160
FISH	**28**	**2.275360**	**2.275360**
FISH	63	0.000000	2.275360
GRAPE	46	0.000000	0.084660
HAWTHORN	65	0.000000	0.013180
HAZELNUT	1277	0.000000	0.044360
HICKORY	247	0.000000	99.426200
MUSKRAT	480	0.000000	0.490590
MUSKRAT	543	0.000000	0.490590
MUSSEL	**40**	**0.408330**	**4.333780**
OPOSSUM	184	0.000000	0.020350
OPOSSUM	284	0.000000	0.020350
PAWPAW	**12**	**3.366160**	**3.366160**
PLUM	28	0.000000	0.184520
RABBIT	184	0.000000	1.264290
RABBIT	284	0.000000	0.979400
RACCOON	242	0.000000	0.054770
RACCOON	398	0.000000	0.034450
SNAPPING TURTLE	179	0.000000	0.001330
SOFTSHELL TURTLE	274	0.000000	0.001180
SQUIRREL	542	0.000000	0.987650
SQUIRREL	1015	0.000000	0.779260
SWEET ACORNS	500	0.000000	1477.869370
TERRAPIN	165	0.000000	0.031340
TUBER	60	0.000000	1.031300
TUBER	85	0.000000	0.191000
TURKEY	146	0.000000	1.261960
TURKEY	305	0.000000	0.763390
VIBURNUM	28	0.000000	1.748960
WALNUT	887	0.000000	25.094720
** Total **		7.342577	2296.311130

** MACA-93 PRE-MAIZE GARDENING, FALL SEASON

BEAR	328	0.000000	0.770320
BEAR	431	0.000000	0.608200
BERRIES (RUBUS)	81	0.000000	0.013180
BLACKCHERRY	74	0.000000	13.180000
BLUEBERRIES	81	0.000000	0.240440
BOX TURTLE	600	0.000000	1.556890
BITTER ACORNS	160	0.000000	544.091400
CHENOPODIUM SEEDS	153	0.000000	105.476900
DEER	**83**	**1.292727**	**5.090380**
DEER	111	0.000000	0.150430
DUCK	4178	0.000000	0.013160
FISH	**28**	**2.275360**	**2.275360**
FISH	63	0.000000	2.275360
GRAPE	46	0.000000	0.084660
HAWTHORN	65	0.000000	0.013180
HAZELNUT	1277	0.000000	0.044360
HICKORY	247	0.000000	99.426200
MUSKRAT	480	0.000000	0.490590
MUSKRAT	543	0.000000	0.490590
MUSSEL	**40**	**0.408330**	**4.333780**
OPOSSUM	184	0.000000	0.020350
OPOSSUM	284	0.000000	0.020350
PAWPAW	**12**	**3.366160**	**3.366160**
PLUM	28	0.000000	0.184520
RABBIT	184	0.000000	1.264290
RABBIT	284	0.000000	0.979400
RACCOON	242	0.000000	0.054770
RACCOON	398	0.000000	0.034450
SNAPPING TURTLE	179	0.000000	0.001330
SOFTSHELL TURTLE	274	0.000000	0.001180
SQUIRREL	542	0.000000	0.987650
SQUIRREL	1015	0.000000	0.779260
SWEET ACORNS	500	0.000000	1477.869370
TERRAPIN	165	0.000000	0.031340
TUBER	60	0.000000	1.031300
TUBER	85	0.000000	0.191000
TURKEY	146	0.000000	1.261960
TURKEY	305	0.000000	0.763390
VIBURNUM	28	0.000000	1.748960
WALNUT	887	0.000000	25.094720
** Total **		7.342577	2296.311130

** MACA-93 POST-MAIZE GARDENING, FALL SEASON

BEAR	328	0.000000	0.770320
BEAR	431	0.000000	0.608200
BERRIES (RUBUS)	81	0.000000	0.013180
BLACKCHERRY	74	0.000000	13.180000
BLUEBERRIES	81	0.000000	0.240440
BOX TURTLE	600	0.000000	1.556890
BITTER ACORNS	160	0.000000	544.091400
CHENOPODIUM SEEDS	153	0.000000	105.476900
DEER	**83**	**2.804901**	**5.090380**
DEER	111	0.000000	0.150430
DUCK	4178	0.000000	0.013160
FISH	**28**	**2.275360**	**2.275360**
FISH	63	0.000000	2.275360

GRAPE	46	0.000000	0.084660
HAWTHORN	65	0.000000	0.013180
HAZELNUT	1277	0.000000	0.044360
HICKORY	247	0.000000	99.426200
MAIZE	83.7	0.000000	414.094510
MUSKRAT	480	0.000000	0.490590
MUSKRAT	543	0.000000	0.490590
MUSSEL	**40**	**0.592963**	**4.333780**
OPOSSUM	184	0.000000	0.020350
OPOSSUM	284	0.000000	0.020350
PAWPAW	**12**	**3.366160**	**3.366160**
PLUM	28	0.000000	0.184520
RABBIT	184	0.000000	1.264290
RABBIT	284	0.000000	0.979400
RACCOON	242	0.000000	0.054770
RACCOON	398	0.000000	0.034450
SNAPPING TURTLE	179	0.000000	0.001330
SOFTSHELL TURTLE	274	0.000000	0.001180
SQUIRREL	542	0.000000	0.987650
SQUIRREL	1015	0.000000	0.779260
SWEET ACORNS	500	0.000000	1477.869370
TERRAPIN	165	0.000000	0.031340
TUBER	60	0.000000	1.031300
TUBER	85	0.000000	0.191000
TURKEY	146	0.000000	1.261960
TURKEY	305	0.000000	0.763390
VIBURNUM	28	0.000000	1.748960
WALNUT	887	0.000000	25.094720
** Total **		9.039384	2710.405640

** MACA-93 FORAGING, SPRING SEASON

AMARANTH GREENS	**44**	**0.690820**	**0.690820**
BEAR	440	0.000000	0.575740
BEAR	239	0.000000	0.673050
BOX TURTLE	600	0.000000	1.556890
CHENOPODIUM GREENS	**44**	**0.143820**	**0.143820**
DEER	**97**	**0.148460**	**0.148460**
DEER	**160**	**0.678939**	**4.679440**
DUCK	4178	0.000000	0.013160
FISH	**28**	**2.275360**	**2.275360**
GREENS (OTHER)	100	0.000000	0.188740
MUSHROOM	110	0.000000	3.767000
MUSKRAT	480	0.000000	0.490590
MUSKRAT	543	0.000000	0.490590
OPOSSUM	269	0.000000	0.020350
OPOSSUM	289	0.000000	0.020350
POKEGREENS	**44**	**0.773469**	**0.860780**
RABBIT	269	0.000000	0.979400
RABBIT	289	0.000000	1.264290
RACCOON	395	0.000000	0.032860
RACCOON	430	0.000000	0.043810
SNAPPING TURTLE	179	0.000000	0.001330
SOFTSHELL TURTLE	274	0.000000	0.001180
SQUIRREL	1176	0.000000	0.572140
SQUIRREL	704	0.000000	0.844630
TERRAPIN	165	0.000000	0.031340
TUBER	60	0.000000	0.993110
TUBER	85	0.000000	0.649380

TURKEY	248	0.000000	1.013180
TURKEY	**216**	**1.261960**	**1.261960**
** Total **		5.972828	24.283750

** MACA-93 PRE-MAIZE GARDENING, SPRING SEASON

AMARANTH GREENS	**44**	**0.690820**	**0.690820**
BEAR	440	0.000000	0.575740
BEAR	239	0.000000	0.673050
BOX TURTLE	600	0.000000	1.556890
CHENOPODIUM GREENS	**44**	**0.143820**	**0.143820**
DEER	**97**	**0.148460**	**0.148460**
DEER	**160**	**0.678939**	**4.679440**
DUCK	4178	0.000000	0.013160
FISH	**28**	**2.275360**	**2.275360**
GREENS (OTHER)	100	0.000000	0.188740
MUSHROOM	110	0.000000	3.767000
MUSKRAT	480	0.000000	0.490590
MUSKRAT	543	0.000000	0.490590
OPOSSUM	269	0.000000	0.020350
OPOSSUM	289	0.000000	0.020350
POKEGREENS	**44**	**0.773469**	**0.860780**
RABBIT	269	0.000000	0.979400
RABBIT	289	0.000000	1.264290
RACCOON	395	0.000000	0.032860
RACCOON	430	0.000000	0.043810
SNAPPING TURTLE	179	0.000000	0.001330
SOFTSHELL TURTLE	274	0.000000	0.001180
SQUIRREL	1176	0.000000	0.572140
SQUIRREL	704	0.000000	0.844630
TERRAPIN	165	0.000000	0.031340
TUBER	60	0.000000	0.993110
TUBER	85	0.000000	0.649380
TURKEY	248	0.000000	1.013180
TURKEY	**216**	**1.261960**	**1.261960**
** Total **		5.972828	24.283750

** MACA-93 POST-MAIZE GARDENING, SPRING SEASON

AMARANTH GREENS	**44**	**0.690820**	**0.690820**
BEAR	440	0.000000	0.575740
BEAR	239	0.000000	0.673050
BOX TURTLE	**600**	**0.820664**	**1.556890**
CHENOPODIUM GREENS	**44**	**0.143820**	**0.143820**
DEER	**97**	**0.148460**	**0.148460**
DEER	**160**	**1.575602**	**4.679440**
DUCK	4178	0.000000	0.013160
FISH	**28**	**2.275360**	**2.275360**
GREENS (OTHER)	**100**	**0.188740**	**0.188740**
MUSHROOM	110	0.000000	3.767000
MUSKRAT	480	0.000000	0.490590
MUSKRAT	543	0.000000	0.490590
OPOSSUM	269	0.000000	0.020350
OPOSSUM	289	0.000000	0.020350
POKEGREENS	**44**	**0.860780**	**0.860780**
RABBIT	269	0.000000	0.979400
RABBIT	289	0.000000	1.264290

RACCOON	395	0.000000	0.032860
RACCOON	430	0.000000	0.043810
SNAPPING TURTLE	**179**	**0.001330**	**0.001330**
SOFTSHELL TURTLE	274	0.000000	0.001180
SQUIRREL	1176	0.000000	0.572140
SQUIRREL	704	0.000000	0.844630
TERRAPIN	**165**	**0.031340**	**0.031340**
TUBER	**60**	**0.993110**	**0.993110**
TUBER	**85**	**0.649380**	**0.649380**
TURKEY	248	0.000000	1.013180
TURKEY	**216**	**1.261960**	**1.261960**
** Total **		9.641366	24.283750

** MACA-93 FORAGING, SUMMER SEASON

AMARANTH GREENS	44	0.000000	0.690820
BEAR	475	0.000000	0.575740
BEAR	416	0.000000	0.608200
BERRIES (RUBUS)	65	0.000000	0.013180
BLACKCHERRY	60	0.000000	13.180000
BLUEBERRIES	65	0.000000	0.240440
BOX TURTLE	600	0.000000	1.556890
CHENOPODIUM GREENS	**44**	**0.143820**	**0.143820**
DEER	132	0.000000	0.148460
DEER	**96**	**0.150430**	**0.150430**
DUCK	4178	0.000000	0.013160
FISH	**63**	**2.275360**	**2.275360**
FISH	**28**	**2.275360**	**2.275360**
GRAPE	**28**	**0.084660**	**0.084660**
GREENS (OTHER)	100	0.000000	0.094370
MUSKRAT	543	0.000000	0.490590
MUSKRAT	480	0.000000	0.490590
MUSSEL	**40**	**2.975574**	**4.333780**
OPOSSUM	304	0.000000	0.020350
OPOSSUM	269	0.000000	0.020350
RABBIT	304	0.000000	0.979400
RABBIT	269	0.000000	0.979400
RACCOON	430	0.000000	0.032860
RACCOON	378	0.000000	0.034450
SNAPPING TURTLE	179	0.000000	0.001330
SOFTSHELL TURTLE	274	0.000000	0.001180
SQUIRREL	1211	0.000000	0.572140
SQUIRREL	1000	0.000000	0.779260
TERRAPIN	165	0.000000	0.031340
TUBER	**85**	**0.043109**	**0.993110**
TUBER	**60**	**0.191000**	**0.191000**
TURKEY	283	0.000000	1.013180
TURKEY	290	0.000000	0.763390
** Total **		8.139313	33.778590

** MACA-93 PRE-MAIZE GARDENING, SUMMER SEASON

AMARANTH GREENS	44	0.000000	0.690820
BEAR	475	0.000000	0.575740
BEAR	416	0.000000	0.608200
BERRIES (RUBUS)	65	0.000000	0.013180
BLACKCHERRY	60	0.000000	13.180000

BLUEBERRIES	65	0.000000	0.240440
BOX TURTLE	600	0.000000	1.556890
CHENOPODIUM GREENS	44	0.000000	0.143820
DEER	132	0.000000	0.148460
DEER	96	0.000000	0.150430
DUCK	4178	0.000000	0.013160
FISH	63	0.000000	2.275360
FISH	28	0.000000	2.275360
GRAPE	28	0.000000	0.084660
GREENS (OTHER)	100	0.000000	0.094370
MUSKRAT	543	0.000000	0.490590
MUSKRAT	480	0.000000	0.490590
MUSSEL	40	0.000000	4.333780
OPOSSUM	304	0.000000	0.020350
OPOSSUM	269	0.000000	0.020350
RABBIT	304	0.000000	0.979400
RABBIT	269	0.000000	0.979400
RACCOON	430	0.000000	0.032860
RACCOON	378	0.000000	0.034450
SNAPPING TURTLE	179	0.000000	0.001330
SOFTSHELL TURTLE	274	0.000000	0.001180
SQUASH	**13**	**11.142375**	**414.094510**
SQUIRREL	1211	0.000000	0.572140
SQUIRREL	1000	0.000000	0.779260
TERRAPIN	165	0.000000	0.031340
TUBER	85	0.000000	0.993110
TUBER	60	0.000000	0.191000
TURKEY	283	0.000000	1.013180
TURKEY	290	0.000000	0.763390
** Total **		11.142375	447.873100

** MACA-93 POST-MAIZE GARDENING, SUMMER SEASON

AMARANTH GREENS	44	0.000000	0.690820
BEAR	475	0.000000	0.575740
BEAR	416	0.000000	0.608200
BERRIES (RUBUS)	65	0.000000	0.013180
BLACKCHERRY	60	0.000000	13.180000
BLUEBERRIES	65	0.000000	0.240440
BOX TURTLE	600	0.000000	1.556890
CHENOPODIUM GREENS	44	0.000000	0.143820
DEER	132	0.000000	0.148460
DEER	96	0.000000	0.150430
DUCK	4178	0.000000	0.013160
FISH	63	0.000000	2.275360
FISH	28	0.000000	2.275360
GRAPE	28	0.000000	0.084660
GREENS (OTHER)	100	0.000000	0.094370
MAIZE	71.1	0.000000	414.094510
MUSKRAT	543	0.000000	0.490590
MUSKRAT	480	0.000000	0.490590
MUSSEL	40	0.000000	4.333780
OPOSSUM	304	0.000000	0.020350
OPOSSUM	269	0.000000	0.020350
RABBIT	304	0.000000	0.979400
RABBIT	269	0.000000	0.979400
RACCOON	430	0.000000	0.032860
RACCOON	378	0.000000	0.034450
SNAPPING TURTLE	179	0.000000	0.001330

SOFTSHELL TURTLE	274	0.000000	0.001180
SQUASH	**13**	**15.599325**	**414.094510**
SQUIRREL	1211	0.000000	0.572140
SQUIRREL	1000	0.000000	0.779260
TERRAPIN	165	0.000000	0.031340
TUBER	85	0.000000	0.993110
TUBER	60	0.000000	0.191000
TURKEY	283	0.000000	1.013180
TURKEY	290	0.000000	0.763390
** Total **		15.599325	861.967610

** MACA-93 FORAGING, WINTER SEASON

BEAR	363	0.000000	0.770320
BEAR	169	0.000000	0.673050
BITTER ACORNS	170	0.000000	544.091400
CHENOPODIUM SEEDS	**163**	**2.529779**	**105.476900**
DEER	118	0.000000	5.090380
DEER	**90**	**0.872247**	**4.679440**
DUCK	4178	0.000000	0.013160
FISH	63	0.000000	2.275360
HAWTHORN	**81**	**0.013180**	**0.013180**
HAZELNUT	1287	0.000000	0.044360
HICKORY	277	0.000000	99.426200
MUSKRAT	543	0.000000	0.490590
MUSKRAT	480	0.000000	0.490590
OPOSSUM	219	0.000000	0.040700
PLUM	46	0.000000	0.184520
RABBIT	219	0.000000	2.528580
RACCOON	277	0.000000	0.054770
RACCOON	395	0.000000	0.043810
SNAPPING TURTLE	179	0.000000	0.001330
SQUIRREL	577	0.000000	0.987650
SQUIRREL	634	0.000000	0.844630
SWEET ACORNS	510	0.000000	1477.869370
TUBER	85	0.000000	1.031300
TUBER	60	0.000000	0.649380
TURKEY	181	0.000000	1.261960
TURKEY	146	0.000000	1.261960
VIBURNUM	**46**	**1.748960**	**1.748960**
WALNUT	897	0.000000	25.094720
** Total **		5.164166	2277.138570

** MACA-93 PRE-MAIZE GARDENING, WINTER SEASON

BEAR	363	0.000000	0.770320
BEAR	169	0.000000	0.673050
BITTER ACORNS	170	0.000000	544.091400
CHENOPODIUM SEEDS	**163**	**2.769475**	**105.476900**
DEER	118	0.000000	5.090380
DEER	90	0.000000	4.679440
DUCK	4178	0.000000	0.013160
FISH	63	0.000000	2.275360
HAWTHORN	**81**	**0.013180**	**0.013180**
HAZELNUT	1287	0.000000	0.044360
HICKORY	277	0.000000	99.426200
MUSKRAT	543	0.000000	0.490590

MUSKRAT	480	0.000000	0.490590
OPOSSUM	**219**	**0.006617**	**0.040700**
PLUM	46	0.000000	0.184520
RABBIT	219	0.000000	2.528580
RACCOON	277	0.000000	0.054770
RACCOON	395	0.000000	0.043810
SNAPPING TURTLE	179	0.000000	0.001330
SQUASH	**26**	**1.442856**	**414.094510**
SQUIRREL	577	0.000000	0.987650
SQUIRREL	634	0.000000	0.844630
SUNFLOWER	418	0.000000	83.034000
SWEET ACORNS	510	0.000000	1477.869370
TUBER	85	0.000000	1.031300
TUBER	60	0.000000	0.649380
TURKEY	181	0.000000	1.261960
TURKEY	146	0.000000	1.261960
VIBURNUM	**46**	**0.591667**	**1.748960**
WALNUT	897	0.000000	25.094720
** Total **		4.823795	2774.267080

** MACA-93 POST-MAIZE GARDENING, WINTER SEASON

BEAR	363	0.000000	0.770320
BEAR	169	0.000000	0.673050
BITTER ACORNS	170	0.000000	544.091400
CHENOPODIUM SEEDS	**163**	**3.879488**	**105.476900**
DEER	118	0.000000	5.090380
DEER	90	0.000000	4.679440
DUCK	4178	0.000000	0.013160
FISH	63	0.000000	2.275360
HAWTHORN	**81**	**0.013180**	**0.013180**
HAZELNUT	1287	0.000000	0.044360
HICKORY	277	0.000000	99.426200
MAIZE	83.7	0.000000	414.094510
MUSKRAT	543	0.000000	0.490590
MUSKRAT	480	0.000000	0.490590
OPOSSUM	**219**	**0.009169**	**0.040700**
PLUM	46	0.000000	0.184520
RABBIT	219	0.000000	2.528580
RACCOON	277	0.000000	0.054770
RACCOON	395	0.000000	0.043810
SNAPPING TURTLE	179	0.000000	0.001330
SQUASH	**26**	**2.020077**	**414.094510**
SQUIRREL	577	0.000000	0.987650
SQUIRREL	634	0.000000	0.844630
SUNFLOWER	418	0.000000	83.034000
SWEET ACORNS	510	0.000000	1477.869370
TUBER	85	0.000000	1.031300
TUBER	60	0.000000	0.649380
TURKEY	181	0.000000	1.261960
TURKEY	146	0.000000	1.261960
VIBURNUM	**46**	**0.833614**	**1.748960**
WALNUT	897	0.000000	25.094720
** Total **		6.755528	3188.361590

** MACA-137 FORAGING, FALL SEASON

BEAR	328	0.000000	0.740440
BEAR	431	0.000000	0.584620
BEAVER	170	0.000000	0.048760
BEAVER	205	0.000000	0.048760
BERRIES (RUBUS)	81	0.000000	0.072200
BLACKCHERRY	74	0.000000	72.198500
BLUEBERRIES	81	0.000000	0.272150
BOX TURTLE	600	0.000000	1.496540
BITTER ACORNS	160	0.000000	427.029060
CHENOPODIUM SEEDS	153	0.000000	577.790160
DEER	**83**	**1.204437**	**3.534180**
DEER	111	0.000000	0.824040
DUCK	4178	0.000000	0.355240
FISH	**28**	**4.701540**	**61.420300**
FISH	63	0.000000	61.420300
GRAPE	46	0.000000	0.463730
HAWTHORN	65	0.000000	0.072200
HAZELNUT	1277	0.000000	0.243020
HICKORY	247	0.000000	69.030210
MUSKRAT	480	0.000000	2.687390
MUSKRAT	543	0.000000	2.687390
MUSSEL	**40**	**0.557848**	**116.984290**
OPOSSUM	184	0.000000	0.111460
OPOSSUM	284	0.000000	0.111460
PAWPAW	**12**	**3.810100**	**3.810100**
PLUM	28	0.000000	1.010780
RABBIT	184	0.000000	1.215290
RABBIT	284	0.000000	0.941430
RACCOON	242	0.000000	0.300010
RACCOON	398	0.000000	0.188730
SNAPPING TURTLE	179	0.000000	0.035920
SOFTSHELL TURTLE	274	0.000000	0.031850
SQUIRREL	542	0.000000	0.949360
SQUIRREL	1015	0.000000	0.749060
SWEET ACORNS	500	0.000000	1177.961160
TERRAPIN	165	0.000000	0.846100
TUBER	60	0.000000	5.649320
TUBER	85	0.000000	1.046300
TURKEY	146	0.000000	1.080230
TURKEY	305	0.000000	0.653450
VIBURNUM	28	0.000000	1.979620
WALNUT	887	0.000000	137.465940
** Total **		10.273925	2736.141050

** MACA-137 PRE-MAIZE GARDENING, FALL SEASON

BEAR	328	0.000000	0.740440
BEAR	431	0.000000	0.584620
BEAVER	170	0.000000	0.048760
BEAVER	205	0.000000	0.048760
BERRIES (RUBUS)	81	0.000000	0.072200
BLACKCHERRY	74	0.000000	72.198500
BLUEBERRIES	81	0.000000	0.272150
BOX TURTLE	600	0.000000	1.496540
BITTER ACORNS	160	0.000000	427.029060
CHENOPODIUM SEEDS	153	0.000000	577.790160
DEER	**83**	**1.204437**	**3.534180**
DEER	111	0.000000	0.824040
DUCK	4178	0.000000	0.355240

FISH	**28**	**4.701540**	**61.420300**
FISH	63	0.000000	61.420300
GRAPE	46	0.000000	0.463730
HAWTHORN	65	0.000000	0.072200
HAZELNUT	1277	0.000000	0.243020
HICKORY	247	0.000000	69.030210
MUSKRAT	480	0.000000	2.687390
MUSKRAT	543	0.000000	2.687390
MUSSEL	**40**	**0.557848**	**116.984290**
OPOSSUM	184	0.000000	0.111460
OPOSSUM	284	0.000000	0.111460
PAWPAW	**12**	**3.810100**	**3.810100**
PLUM	28	0.000000	1.010780
RABBIT	184	0.000000	1.215290
RABBIT	284	0.000000	0.941430
RACCOON	242	0.000000	0.300010
RACCOON	398	0.000000	0.188730
SNAPPING TURTLE	179	0.000000	0.035920
SOFTSHELL TURTLE	274	0.000000	0.031850
SQUIRREL	542	0.000000	0.949360
SQUIRREL	1015	0.000000	0.749060
SWEET ACORNS	500	0.000000	1177.961160
TERRAPIN	165	0.000000	0.846100
TUBER	60	0.000000	5.649320
TUBER	85	0.000000	1.046300
TURKEY	146	0.000000	1.080230
TURKEY	305	0.000000	0.653450
VIBURNUM	28	0.000000	1.979620
WALNUT	887	0.000000	137.465940
** Total **		10.273925	2736.141050

** MACA-137 POST-MAIZE GARDENING, FALL SEASON

BEAR	328	0.000000	0.740440
BEAR	431	0.000000	0.584620
BEAVER	170	0.000000	0.048760
BEAVER	205	0.000000	0.048760
BERRIES (RUBUS)	81	0.000000	0.072200
BLACKCHERRY	74	0.000000	72.198500
BLUEBERRIES	81	0.000000	0.272150
BOX TURTLE	600	0.000000	1.496540
BITTER ACORNS	160	0.000000	427.029060
CHENOPODIUM SEEDS	153	0.000000	577.790160
DEER	**83**	**1.204437**	**3.534180**
DEER	111	0.000000	0.824040
DUCK	4178	0.000000	0.355240
FISH	**28**	**4.701540**	**61.420300**
FISH	63	0.000000	61.420300
GRAPE	46	0.000000	0.463730
HAWTHORN	65	0.000000	0.072200
HAZELNUT	1277	0.000000	0.243020
HICKORY	247	0.000000	69.030210
MAIZE	83.7	0.000000	2268.361350
MUSKRAT	480	0.000000	2.687390
MUSKRAT	543	0.000000	2.687390
MUSSEL	**40**	**0.557848**	**116.984290**
OPOSSUM	184	0.000000	0.111460
OPOSSUM	284	0.000000	0.111460

PAWPAW	**12**	**3.810100**	**3.810100**
PLUM	28	0.000000	1.010780
RABBIT	184	0.000000	1.215290
RABBIT	284	0.000000	0.941430
RACCOON	242	0.000000	0.300010
RACCOON	398	0.000000	0.188730
SNAPPING TURTLE	179	0.000000	0.035920
SOFTSHELL TURTLE	274	0.000000	0.031850
SQUIRREL	542	0.000000	0.949360
SQUIRREL	1015	0.000000	0.749060
SWEET ACORNS	500	0.000000	1177.961160
TERRAPIN	165	0.000000	0.846100
TUBER	60	0.000000	5.649320
TUBER	85	0.000000	1.046300
TURKEY	146	0.000000	1.080230
TURKEY	305	0.000000	0.653450
VIBURNUM	28	0.000000	1.979620
WALNUT	887	0.000000	137.465940
** Total **		10.273925	5004.502400

** MACA-137 FORAGING, SPRING SEASON

AMARANTH GREENS	**44**	**1.966522**	**3.784210**
BEAR	440	0.000000	0.553420
BEAR	239	0.000000	0.646960
BEAVER	170	0.000000	0.048760
BEAVER	205	0.000000	0.048760
BOX TURTLE	600	0.000000	1.496540
CHENOPODIUM GREENS	44	0.000000	0.787830
DEER	97	0.000000	0.813270
DEER	160	0.000000	3.248870
DUCK	4178	0.000000	0.355240
FISH	**28**	**8.588686**	**61.420300**
GREENS (OTHER)	100	0.000000	1.033880
MUSHROOM	110	0.000000	2.615380
MUSKRAT	480	0.000000	2.687390
MUSKRAT	543	0.000000	2.687390
OPOSSUM	269	0.000000	0.111460
OPOSSUM	289	0.000000	0.111460
POKEGREENS	44	0.000000	0.974300
RABBIT	269	0.000000	0.941430
RABBIT	289	0.000000	1.215290
RACCOON	395	0.000000	0.180010
RACCOON	430	0.000000	0.240000
SNAPPING TURTLE	179	0.000000	0.035920
SOFTSHELL TURTLE	274	0.000000	0.031850
SQUIRREL	1176	0.000000	0.549960
SQUIRREL	704	0.000000	0.811890
TERRAPIN	165	0.000000	0.846100
TUBER	60	0.000000	5.440160
TUBER	85	0.000000	3.557220
TURKEY	248	0.000000	0.867280
TURKEY	216	0.000000	1.080230
** Total **		10.555208	99.222760

** MACA-137 PRE-MAIZE GARDENING, SPRING SEASON

AMARANTH GREENS	**44**	**1.966522**	**3.784210**
BEAR	440	0.000000	0.553420
BEAR	239	0.000000	0.646960
BEAVER	170	0.000000	0.048760
BEAVER	205	0.000000	0.048760
BOX TURTLE	600	0.000000	1.496540
CHENOPODIUM GREENS	44	0.000000	0.787830
DEER	97	0.000000	0.813270
DEER	160	0.000000	3.248870
DUCK	4178	0.000000	0.355240
FISH	**28**	**8.588686**	**61.420300**
GREENS (OTHER)	100	0.000000	1.033880
MUSHROOM	110	0.000000	2.615380
MUSKRAT	480	0.000000	2.687390
MUSKRAT	543	0.000000	2.687390
OPOSSUM	269	0.000000	0.111460
OPOSSUM	289	0.000000	0.111460
POKEGREENS	44	0.000000	0.974300
RABBIT	269	0.000000	0.941430
RABBIT	289	0.000000	1.215290
RACCOON	395	0.000000	0.180010
RACCOON	430	0.000000	0.240000
SNAPPING TURTLE	179	0.000000	0.035920
SOFTSHELL TURTLE	274	0.000000	0.031850
SQUIRREL	1176	0.000000	0.549960
SQUIRREL	704	0.000000	0.811890
TERRAPIN	165	0.000000	0.846100
TUBER	60	0.000000	5.440160
TUBER	85	0.000000	3.557220
TURKEY	248	0.000000	0.867280
TURKEY	216	0.000000	1.080230
** Total **		10.555208	99.222760

** MACA-137 POST-MAIZE GARDENING, SPRING SEASON

AMARANTH GREENS	**44**	**1.966522**	**3.784210**
BEAR	440	0.000000	0.553420
BEAR	239	0.000000	0.646960
BEAVER	170	0.000000	0.048760
BEAVER	205	0.000000	0.048760
BOX TURTLE	600	0.000000	1.496540
CHENOPODIUM GREENS	44	0.000000	0.787830
DEER	97	0.000000	0.813270
DEER	160	0.000000	3.248870
DUCK	4178	0.000000	0.355240
FISH	**28**	**8.588686**	**61.420300**
GREENS (OTHER)	100	0.000000	1.033880
MUSHROOM	110	0.000000	2.615380
MUSKRAT	480	0.000000	2.687390
MUSKRAT	543	0.000000	2.687390
OPOSSUM	269	0.000000	0.111460
OPOSSUM	289	0.000000	0.111460
POKEGREENS	44	0.000000	0.974300
RABBIT	269	0.000000	0.941430
RABBIT	289	0.000000	1.215290
RACCOON	395	0.000000	0.180010
RACCOON	430	0.000000	0.240000
SNAPPING TURTLE	179	0.000000	0.035920
SOFTSHELL TURTLE	274	0.000000	0.031850

SQUIRREL	1176	0.000000	0.549960
SQUIRREL	704	0.000000	0.811890
TERRAPIN	165	0.000000	0.846100
TUBER	60	0.000000	5.440160
TUBER	85	0.000000	3.557220
TURKEY	248	0.000000	0.867280
TURKEY	216	0.000000	1.080230
** Total **		10.555208	99.222760

** MACA-137 FORAGING, SUMMER SEASON

AMARANTH GREENS	**44**	**0.185836**	**2.828000**
BEAR	475	0.000000	0.561260
BEAR	416	0.000000	0.592900
BEAVER	205	0.000000	0.036440
BEAVER	170	0.000000	0.036440
BERRIES (RUBUS)	65	0.000000	0.053960
BLACKCHERRY	60	0.000000	53.955000
BLUEBERRIES	65	0.000000	0.259930
BOX TURTLE	600	0.000000	1.517750
CHENOPODIUM GREENS	44	0.000000	0.588760
DEER	132	0.000000	0.607770
DEER	96	0.000000	0.615820
DUCK	4178	0.000000	0.234990
FISH	63	0.000000	40.629770
FISH	**28**	**8.770240**	**40.629770**
GRAPE	28	0.000000	0.346550
GREENS (OTHER)	100	0.000000	0.386320
MUSKRAT	543	0.000000	2.008330
MUSKRAT	480	0.000000	2.008330
MUSSEL	**40**	**0.439315**	**77.385560**
OPOSSUM	304	0.000000	0.083300
OPOSSUM	269	0.000000	0.083300
RABBIT	304	0.000000	0.954770
RABBIT	269	0.000000	0.954770
RACCOON	430	0.000000	0.134520
RACCOON	378	0.000000	0.141040
SNAPPING TURTLE	179	0.000000	0.023760
SOFTSHELL TURTLE	274	0.000000	0.021070
SQUIRREL	1211	0.000000	0.557750
SQUIRREL	1000	0.000000	0.759680
TERRAPIN	165	0.000000	0.559700
TUBER	85	0.000000	4.065510
TUBER	60	0.000000	0.781920
TURKEY	283	0.000000	0.921370
TURKEY	290	0.000000	0.694210
** Total **		9.395391	236.020320

** MACA-137 PRE-MAIZE GARDENING, SUMMER SEASON

AMARANTH GREENS	44	0.000000	3.784210
BEAR	475	0.000000	0.553420
BEAR	416	0.000000	0.584620
BEAVER	205	0.000000	0.048760
BEAVER	170	0.000000	0.048760
BERRIES (RUBUS)	65	0.000000	0.072200
BLACKCHERRY	60	0.000000	72.198500

BLUEBERRIES	65	0.000000	0.272150
BOX TURTLE	600	0.000000	1.496540
CHENOPODIUM GREENS	44	0.000000	0.787830
DEER	132	0.000000	0.813270
DEER	96	0.000000	0.824040
DUCK	4178	0.000000	0.355240
FISH	63	0.000000	61.420300
FISH	28	0.000000	61.420300
GRAPE	28	0.000000	0.463730
GREENS (OTHER)	100	0.000000	0.516940
MUSKRAT	543	0.000000	2.687390
MUSKRAT	480	0.000000	2.687390
MUSSEL	40	0.000000	116.984290
OPOSSUM	304	0.000000	0.111460
OPOSSUM	269	0.000000	0.111460
RABBIT	304	0.000000	0.941430
RABBIT	269	0.000000	0.941430
RACCOON	430	0.000000	0.180010
RACCOON	378	0.000000	0.188730
SNAPPING TURTLE	179	0.000000	0.035920
SOFTSHELL TURTLE	274	0.000000	0.031850
SQUASH	**13**	**15.599325**	**2268.361350**
SQUIRREL	1211	0.000000	0.549960
SQUIRREL	1000	0.000000	0.749060
TERRAPIN	165	0.000000	0.846100
TUBER	85	0.000000	5.440160
TUBER	60	0.000000	1.046300
TURKEY	283	0.000000	0.867280
TURKEY	290	0.000000	0.653450
** Total **		15.599325	2609.075830

** MACA-137 POST-MAIZE GARDENING, SUMMER SEASON

AMARANTH GREENS	44	0.000000	3.784210
BEAR	475	0.000000	0.553420
BEAR	416	0.000000	0.584620
BEAVER	205	0.000000	0.048760
BEAVER	170	0.000000	0.048760
BERRIES (RUBUS)	65	0.000000	0.072200
BLACKCHERRY	60	0.000000	72.198500
BLUEBERRIES	65	0.000000	0.272150
BOX TURTLE	600	0.000000	1.496540
CHENOPODIUM GREENS	44	0.000000	0.787830
DEER	132	0.000000	0.813270
DEER	96	0.000000	0.824040
DUCK	4178	0.000000	0.355240
FISH	63	0.000000	61.420300
FISH	28	0.000000	61.420300
GRAPE	28	0.000000	0.463730
GREENS (OTHER)	100	0.000000	0.516940
MAIZE	71.1	0.000000	2268.361350
MUSKRAT	543	0.000000	2.687390
MUSKRAT	480	0.000000	2.687390
MUSSEL	40	0.000000	116.984290
OPOSSUM	304	0.000000	0.111460
OPOSSUM	269	0.000000	0.111460
RABBIT	304	0.000000	0.941430
RABBIT	269	0.000000	0.941430
RACCOON	430	0.000000	0.180010

RACCOON	378	0.000000	0.188730
SNAPPING TURTLE	179	0.000000	0.035920
SOFTSHELL TURTLE	274	0.000000	0.031850
SQUASH	**13**	**15.599325**	**2268.361350**
SQUIRREL	1211	0.000000	0.549960
SQUIRREL	1000	0.000000	0.749060
TERRAPIN	165	0.000000	0.846100
TUBER	85	0.000000	5.440160
TUBER	60	0.000000	1.046300
TURKEY	283	0.000000	0.867280
TURKEY	290	0.000000	0.653450
** Total **		15.599325	4877.437180

** MACA-137 FORAGING, WINTER SEASON

BEAR	363	0.000000	0.740440
BEAR	169	0.000000	0.646960
BEAVER	205	0.000000	0.048760
BEAVER	170	0.000000	0.048760
BITTER ACORNS	170	0.000000	427.029060
CHENOPODIUM SEEDS	**163**	**3.686866**	**577.790160**
DEER	118	0.000000	3.534180
DEER	**90**	**0.263997**	**3.248870**
DUCK	4178	0.000000	0.355240
FISH	63	0.000000	61.420300
HAWTHORN	**81**	**0.072200**	**0.072200**
HAZELNUT	1287	0.000000	0.243020
HICKORY	277	0.000000	69.030210
MUSKRAT	543	0.000000	2.687390
MUSKRAT	480	0.000000	2.687390
OPOSSUM	219	0.000000	0.222920
PLUM	46	0.000000	1.010780
RABBIT	219	0.000000	2.430580
RACCOON	277	0.000000	0.300010
RACCOON	395	0.000000	0.240000
SNAPPING TURTLE	179	0.000000	0.035920
SQUIRREL	577	0.000000	0.949360
SQUIRREL	634	0.000000	0.811890
SWEET ACORNS	510	0.000000	1177.961160
TUBER	85	0.000000	5.649320
TUBER	60	0.000000	3.557220
TURKEY	181	0.000000	1.080230
TURKEY	146	0.000000	1.080230
VIBURNUM	**46**	**1.979620**	**1.979620**
WALNUT	897	0.000000	137.465940
** Total **		6.002683	2484.358120

** MACA-137 PRE-MAIZE GARDENING, WINTER SEASON

BEAR	363	0.000000	0.740440
BEAR	169	0.000000	0.646960
BEAVER	205	0.000000	0.048760
BEAVER	170	0.000000	0.048760
BITTER ACORNS	170	0.000000	427.029060
CHENOPODIUM SEEDS	**163**	**3.943183**	**577.790160**
DEER	118	0.000000	3.534180

DEER	90	0.000000	3.248870
DUCK	4178	0.000000	0.355240
FISH	63	0.000000	61.420300
HAWTHORN	**81**	**0.072200**	**0.072200**
HAZELNUT	1287	0.000000	0.243020
HICKORY	277	0.000000	69.030210
MUSKRAT	543	0.000000	2.687390
MUSKRAT	480	0.000000	2.687390
OPOSSUM	219	0.000000	0.222920
PLUM	46	0.000000	1.010780
RABBIT	**219**	**0.027587**	**2.430580**
RACCOON	277	0.000000	0.300010
RACCOON	395	0.000000	0.240000
SNAPPING TURTLE	179	0.000000	0.035920
SQUASH	**26**	**0.746779**	**2268.361350**
SQUIRREL	577	0.000000	0.949360
SQUIRREL	634	0.000000	0.811890
SUNFLOWER	418	0.000000	454.850550
SWEET ACORNS	510	0.000000	1177.961160
TUBER	85	0.000000	5.649320
TUBER	60	0.000000	3.557220
TURKEY	181	0.000000	1.080230
TURKEY	146	0.000000	1.080230
VIBURNUM	**46**	**0.773107**	**1.979620**
WALNUT	897	0.000000	137.465940
** Total **		5.562856	5207.570020

** MACA-137 POST-MAIZE GARDENING, WINTER SEASON

BEAR	363	0.000000	0.740440
BEAR	169	0.000000	0.646960
BEAVER	205	0.000000	0.048760
BEAVER	170	0.000000	0.048760
BITTER ACORNS	170	0.000000	427.029060
CHENOPODIUM SEEDS	**163**	**3.943183**	**577.790160**
DEER	118	0.000000	3.534180
DEER	90	0.000000	3.248870
DUCK	4178	0.000000	0.355240
FISH	63	0.000000	61.420300
HAWTHORN	**81**	**0.072200**	**0.072200**
HAZELNUT	1287	0.000000	0.243020
HICKORY	277	0.000000	69.030210
MAIZE	83.7	0.000000	2268.361350
MUSKRAT	543	0.000000	2.687390
MUSKRAT	480	0.000000	2.687390
OPOSSUM	**219**	**0.027587**	**0.222920**
PLUM	46	0.000000	1.010780
RABBIT	219	0.000000	2.430580
RACCOON	277	0.000000	0.300010
RACCOON	395	0.000000	0.240000
SNAPPING TURTLE	179	0.000000	0.035920
SQUASH	**26**	**0.746779**	**2268.361350**
SQUIRREL	577	0.000000	0.949360
SQUIRREL	634	0.000000	0.811890
SUNFLOWER	418	0.000000	454.850550
SWEET ACORNS	510	0.000000	1177.961160
TUBER	85	0.000000	5.649320
TUBER	60	0.000000	3.557220
TURKEY	181	0.000000	1.080230

TURKEY	146	0.000000	1.080230
VIBURNUM	**46**	**0.773107**	**1.979620**
WALNUT	897	0.000000	137.465940
** Total **		5.562856	7475.931370

** MACA-171 FORAGING, FALL SEASON

BEAR	328	0.000000	0.767250
BEAR	431	0.000000	0.605780
BEAVER	170	0.000000	0.016970
BEAVER	205	0.000000	0.016970
BERRIES (RUBUS)	81	0.000000	0.025120
BLACKCHERRY	74	0.000000	25.120000
BLUEBERRIES	81	0.000000	0.160590
BOX TURTLE	600	0.000000	1.550710
BITTER ACORNS	160	0.000000	603.492870
CHENOPODIUM SEEDS	153	0.000000	201.030340
DEER	**83**	**1.556292**	**5.974140**
DEER	111	0.000000	0.286710
DUCK	4178	0.000000	0.048230
FISH	**28**	**4.986552**	**8.338970**
FISH	63	0.000000	8.338970
GRAPE	46	0.000000	0.161350
HAWTHORN	65	0.000000	0.025120
HAZELNUT	1277	0.000000	0.084550
HICKORY	247	0.000000	116.687870
MUSKRAT	480	0.000000	0.935020
MUSKRAT	543	0.000000	0.935020
MUSSEL	**40**	**0.564840**	**15.882830**
OPOSSUM	184	0.000000	0.038780
OPOSSUM	284	0.000000	0.038780
PAWPAW	**12**	**2.248330**	**2.248330**
PLUM	28	0.000000	0.351680
RABBIT	184	0.000000	1.259270
RABBIT	284	0.000000	0.975490
RACCOON	242	0.000000	0.104380
RACCOON	398	0.000000	0.065670
SNAPPING TURTLE	179	0.000000	0.004880
SOFTSHELL TURTLE	274	0.000000	0.004320
SQUIRREL	542	0.000000	0.983730
SQUIRREL	1015	0.000000	0.776170
SWEET ACORNS	500	0.000000	1625.581110
TERRAPIN	165	0.000000	0.114870
TUBER	60	0.000000	1.965560
TUBER	85	0.000000	0.364040
TURKEY	146	0.000000	1.512300
TURKEY	305	0.000000	0.914810
VIBURNUM	28	0.000000	1.168170
WALNUT	887	0.000000	47.828480
** Total **		9.356014	2676.786200

** MACA-171 PRE-MAIZE GARDENING, FALL SEASON

BEAR	328	0.000000	0.767250
BEAR	431	0.000000	0.605780
BEAVER	170	0.000000	0.016970
BEAVER	205	0.000000	0.016970

BERRIES (RUBUS)	81	0.000000	0.025120
BLACKCHERRY	74	0.000000	25.120000
BLUEBERRIES	81	0.000000	0.160590
BOX TURTLE	600	0.000000	1.550710
BITTER ACORNS	160	0.000000	603.492870
CHENOPODIUM SEEDS	153	0.000000	201.030340
DEER	**83**	**1.556292**	**5.974140**
DEER	111	0.000000	0.286710
DUCK	4178	0.000000	0.048230
FISH	**28**	**4.986552**	**8.338970**
FISH	63	0.000000	8.338970
GRAPE	46	0.000000	0.161350
HAWTHORN	65	0.000000	0.025120
HAZELNUT	1277	0.000000	0.084550
HICKORY	247	0.000000	116.687870
MUSKRAT	480	0.000000	0.935020
MUSKRAT	543	0.000000	0.935020
MUSSEL	**40**	**0.564840**	**15.882830**
OPOSSUM	184	0.000000	0.038780
OPOSSUM	284	0.000000	0.038780
PAWPAW	**12**	**2.248330**	**2.248330**
PLUM	28	0.000000	0.351680
RABBIT	184	0.000000	1.259270
RABBIT	284	0.000000	0.975490
RACCOON	242	0.000000	0.104380
RACCOON	398	0.000000	0.065670
SNAPPING TURTLE	179	0.000000	0.004880
SOFTSHELL TURTLE	274	0.000000	0.004320
SQUIRREL	542	0.000000	0.983730
SQUIRREL	1015	0.000000	0.776170
SWEET ACORNS	500	0.000000	1625.581110
TERRAPIN	165	0.000000	0.114870
TUBER	60	0.000000	1.965560
TUBER	85	0.000000	0.364040
TURKEY	146	0.000000	1.512300
TURKEY	305	0.000000	0.914810
VIBURNUM	28	0.000000	1.168170
WALNUT	887	0.000000	47.828480
** Total **		9.356014	2676.786200

** MACA-171 POST-MAIZE GARDENING, FALL SEASON

BEAR	328	0.000000	0.767250
BEAR	431	0.000000	0.605780
BEAVER	170	0.000000	0.016970
BEAVER	205	0.000000	0.016970
BERRIES (RUBUS)	81	0.000000	0.025120
BLACKCHERRY	74	0.000000	25.120000
BLUEBERRIES	81	0.000000	0.160590
BOX TURTLE	600	0.000000	1.550710
BITTER ACORNS	160	0.000000	603.492870
CHENOPODIUM SEEDS	153	0.000000	201.030340
DEER	**83**	**1.556292**	**5.974140**
DEER	111	0.000000	0.286710
DUCK	4178	0.000000	0.048230
FISH	**28**	**4.986552**	**8.338970**
FISH	63	0.000000	8.338970
GRAPE	46	0.000000	0.161350
HAWTHORN	65	0.000000	0.025120

HAZELNUT	1277	0.000000	0.084550
HICKORY	247	0.000000	116.687870
MAIZE	83.7	0.000000	789.230210
MUSKRAT	480	0.000000	0.935020
MUSKRAT	543	0.000000	0.935020
MUSSEL	**40**	**0.564840**	**15.882830**
OPOSSUM	184	0.000000	0.038780
OPOSSUM	284	0.000000	0.038780
PAWPAW	**12**	**2.248330**	**2.248330**
PLUM	28	0.000000	0.351680
RABBIT	184	0.000000	1.259270
RABBIT	284	0.000000	0.975490
RACCOON	242	0.000000	0.104380
RACCOON	398	0.000000	0.065670
SNAPPING TURTLE	179	0.000000	0.004880
SOFTSHELL TURTLE	274	0.000000	0.004320
SQUIRREL	542	0.000000	0.983730
SQUIRREL	1015	0.000000	0.776170
SWEET ACORNS	500	0.000000	1625.581110
TERRAPIN	165	0.000000	0.114870
TUBER	60	0.000000	1.965560
TUBER	85	0.000000	0.364040
TURKEY	146	0.000000	1.512300
TURKEY	305	0.000000	0.914810
VIBURNUM	28	0.000000	1.168170
WALNUT	887	0.000000	47.828480
** Total **		9.356014	3466.016410

** MACA-171 FORAGING, SPRING SEASON

AMARANTH GREENS	**44**	**1.132164**	**1.316640**
BEAR	440	0.000000	0.573440
BEAR	239	0.000000	0.670370
BEAVER	170	0.000000	0.016970
BEAVER	205	0.000000	0.016970
BOX TURTLE	600	0.000000	1.550710
CHENOPODIUM GREENS	**44**	**0.274110**	**0.274110**
DEER	97	0.000000	0.282960
DEER	160	0.000000	5.491850
DUCK	4178	0.000000	0.048230
FISH	**28**	**8.338970**	**8.338970**
GREENS (OTHER)	100	0.000000	0.359720
MUSHROOM	110	0.000000	4.421000
MUSKRAT	480	0.000000	0.935020
MUSKRAT	543	0.000000	0.935020
OPOSSUM	269	0.000000	0.038780
OPOSSUM	289	0.000000	0.038780
POKEGREENS	**44**	**0.574930**	**0.574930**
RABBIT	269	0.000000	0.975490
RABBIT	289	0.000000	1.259270
RACCOON	395	0.000000	0.062630
RACCOON	430	0.000000	0.083500
SNAPPING TURTLE	179	0.000000	0.004880
SOFTSHELL TURTLE	274	0.000000	0.004320
SQUIRREL	1176	0.000000	0.569860
SQUIRREL	704	0.000000	0.841270
TERRAPIN	165	0.000000	0.114870
TUBER	60	0.000000	1.892790
TUBER	85	0.000000	1.237660

TURKEY	248	0.000000	1.214170
TURKEY	**216**	**0.110439**	**1.512300**
** Total **		10.430613	35.657480

** MACA-171 PRE-MAIZE GARDENING, SPRING SEASON

AMARANTH GREENS	**44**	**1.132164**	**1.316640**
BEAR	440	0.000000	0.573440
BEAR	239	0.000000	0.670370
BEAVER	170	0.000000	0.016970
BEAVER	205	0.000000	0.016970
BOX TURTLE	600	0.000000	1.550710
CHENOPODIUM GREENS	**44**	**0.274110**	**0.274110**
DEER	97	0.000000	0.282960
DEER	160	0.000000	5.491850
DUCK	4178	0.000000	0.048230
FISH	**28**	**8.338970**	**8.338970**
GREENS (OTHER)	100	0.000000	0.359720
MUSHROOM	110	0.000000	4.421000
MUSKRAT	480	0.000000	0.935020
MUSKRAT	543	0.000000	0.935020
OPOSSUM	269	0.000000	0.038780
OPOSSUM	289	0.000000	0.038780
POKEGREENS	**44**	**0.574930**	**0.574930**
RABBIT	269	0.000000	0.975490
RABBIT	289	0.000000	1.259270
RACCOON	395	0.000000	0.062630
RACCOON	430	0.000000	0.083500
SNAPPING TURTLE	179	0.000000	0.004880
SOFTSHELL TURTLE	274	0.000000	0.004320
SQUIRREL	1176	0.000000	0.569860
SQUIRREL	704	0.000000	0.841270
TERRAPIN	165	0.000000	0.114870
TUBER	60	0.000000	1.892790
TUBER	85	0.000000	1.237660
TURKEY	248	0.000000	1.214170
TURKEY	**216**	**0.110439**	**1.512300**
** Total **		10.430613	35.657480

** MACA-171 POST-MAIZE GARDENING, SPRING SEASON

AMARANTH GREENS	**44**	**1.132164**	**1.316640**
BEAR	440	0.000000	0.573440
BEAR	239	0.000000	0.670370
BEAVER	170	0.000000	0.016970
BEAVER	205	0.000000	0.016970
BOX TURTLE	600	0.000000	1.550710
CHENOPODIUM GREENS	**44**	**0.274110**	**0.274110**
DEER	97	0.000000	0.282960
DEER	160	0.000000	5.491850
DUCK	4178	0.000000	0.048230
FISH	**28**	**8.338970**	**8.338970**
GREENS (OTHER)	100	0.000000	0.359720
MUSHROOM	110	0.000000	4.421000
MUSKRAT	480	0.000000	0.935020
MUSKRAT	543	0.000000	0.935020
OPOSSUM	269	0.000000	0.038780

OPOSSUM	289	0.000000	0.038780
POKEGREENS	**44**	**0.574930**	**0.574930**
RABBIT	269	0.000000	0.975490
RABBIT	289	0.000000	1.259270
RACCOON	395	0.000000	0.062630
RACCOON	430	0.000000	0.083500
SNAPPING TURTLE	179	0.000000	0.004880
SOFTSHELL TURTLE	274	0.000000	0.004320
SQUIRREL	1176	0.000000	0.569860
SQUIRREL	704	0.000000	0.841270
TERRAPIN	165	0.000000	0.114870
TUBER	60	0.000000	1.892790
TUBER	85	0.000000	1.237660
TURKEY	248	0.000000	1.214170
TURKEY	216	0.110439	1.512300
** Total **		10.430613	35.657480

** MACA-171 FORAGING, SUMMER SEASON

AMARANTH GREENS	44	0.000000	1.316640
BEAR	475	0.000000	0.573440
BEAR	416	0.000000	0.605780
BEAVER	205	0.000000	0.016970
BEAVER	170	0.000000	0.016970
BERRIES (RUBUS)	65	0.000000	0.025120
BLACKCHERRY	60	0.000000	25.120000
BLUEBERRIES	65	0.000000	0.160590
BOX TURTLE	600	0.000000	1.550710
CHENOPODIUM GREENS	**44**	**0.184176**	**0.274110**
DEER	132	0.000000	0.282960
DEER	96	0.000000	0.286710
DUCK	4178	0.000000	0.048230
FISH	**63**	**0.359549**	**8.338970**
FISH	**28**	**8.338970**	**8.338970**
GRAPE	28	0.000000	0.161350
GREENS (OTHER)	100	0.000000	0.179860
MUSKRAT	543	0.000000	0.935020
MUSKRAT	480	0.000000	0.935020
MUSSEL	**40**	**0.437945**	**15.882830**
OPOSSUM	304	0.000000	0.038780
OPOSSUM	269	0.000000	0.038780
RABBIT	304	0.000000	0.975490
RABBIT	269	0.000000	0.975490
RACCOON	430	0.000000	0.062630
RACCOON	378	0.000000	0.065670
SNAPPING TURTLE	179	0.000000	0.004880
SOFTSHELL TURTLE	274	0.000000	0.004320
SQUIRREL	1211	0.000000	0.569860
SQUIRREL	1000	0.000000	0.776170
TERRAPIN	165	0.000000	0.114870
TUBER	85	0.000000	1.892790
TUBER	60	0.000000	0.364040
TURKEY	283	0.000000	1.214170
TURKEY	290	0.000000	0.914810
** Total **		9.320640	73.063000

** MACA-171 PRE-MAIZE GARDENING, SUMMER SEASON

AMARANTH GREENS	44	0.000000	1.316640
BEAR	475	0.000000	0.573440
BEAR	416	0.000000	0.605780
BEAVER	205	0.000000	0.016970
BEAVER	170	0.000000	0.016970
BERRIES (RUBUS)	65	0.000000	0.025120
BLACKCHERRY	60	0.000000	25.120000
BLUEBERRIES	65	0.000000	0.160590
BOX TURTLE	600	0.000000	1.550710
CHENOPODIUM GREENS	44	0.000000	0.274110
DEER	132	0.000000	0.282960
DEER	96	0.000000	0.286710
DUCK	4178	0.000000	0.048230
FISH	63	0.000000	8.338970
FISH	28	0.000000	8.338970
GRAPE	28	0.000000	0.161350
GREENS (OTHER)	100	0.000000	0.179860
MUSKRAT	543	0.000000	0.935020
MUSKRAT	480	0.000000	0.935020
MUSSEL	40	0.000000	15.882830
OPOSSUM	304	0.000000	0.038780
OPOSSUM	269	0.000000	0.038780
RABBIT	304	0.000000	0.975490
RABBIT	269	0.000000	0.975490
RACCOON	430	0.000000	0.062630
RACCOON	378	0.000000	0.065670
SNAPPING TURTLE	179	0.000000	0.004880
SOFTSHELL TURTLE	274	0.000000	0.004320
SQUASH	**13**	**15.599325**	**789.230210**
SQUIRREL	1211	0.000000	0.569860
SQUIRREL	1000	0.000000	0.776170
TERRAPIN	165	0.000000	0.114870
TUBER	85	0.000000	1.892790
TUBER	60	0.000000	0.364040
TURKEY	283	0.000000	1.214170
TURKEY	290	0.000000	0.914810
** Total **		15.599325	862.293210

** MACA-171 POST-MAIZE GARDENING, SUMMER SEASON

AMARANTH GREENS	44	0.000000	1.316640
BEAR	475	0.000000	0.573440
BEAR	416	0.000000	0.605780
BEAVER	205	0.000000	0.016970
BEAVER	170	0.000000	0.016970
BERRIES (RUBUS)	65	0.000000	0.025120
BLACKCHERRY	60	0.000000	25.120000
BLUEBERRIES	65	0.000000	0.160590
BOX TURTLE	600	0.000000	1.550710
CHENOPODIUM GREENS	44	0.000000	0.274110
DEER	132	0.000000	0.282960
DEER	96	0.000000	0.286710
DUCK	4178	0.000000	0.048230
FISH	63	0.000000	8.338970
FISH	28	0.000000	8.338970
GRAPE	28	0.000000	0.161350
GREENS (OTHER)	100	0.000000	0.179860
MAIZE	71.1	0.000000	789.230210
MUSKRAT	543	0.000000	0.935020

MUSKRAT	480	0.000000	0.935020
MUSSEL	40	0.000000	15.882830
OPOSSUM	304	0.000000	0.038780
OPOSSUM	269	0.000000	0.038780
RABBIT	304	0.000000	0.975490
RABBIT	269	0.000000	0.975490
RACCOON	430	0.000000	0.062630
RACCOON	378	0.000000	0.065670
SNAPPING TURTLE	179	0.000000	0.004880
SOFTSHELL TURTLE	274	0.000000	0.004320
SQUASH	**13**	**15.599325**	**789.230210**
SQUIRREL	1211	0.000000	0.569860
SQUIRREL	1000	0.000000	0.776170
TERRAPIN	165	0.000000	0.114870
TUBER	85	0.000000	1.892790
TUBER	60	0.000000	0.364040
TURKEY	283	0.000000	1.214170
TURKEY	290	0.000000	0.914810
** Total **		15.599325	1651.523420

** MACA-171 FORAGING, WINTER SEASON

BEAR	363	0.000000	0.767250
BEAR	169	0.000000	0.670370
BEAVER	205	0.000000	0.016970
BEAVER	170	0.000000	0.016970
BITTER ACORNS	170	0.000000	603.492870
CHENOPODIUM SEEDS	**163**	**3.892860**	**201.030340**
DEER	118	0.000000	5.974140
DEER	**90**	**0.573942**	**5.491850**
DUCK	4178	0.000000	0.048230
FISH	63	0.000000	8.338970
HAWTHORN	**81**	**0.025120**	**0.025120**
HAZELNUT	1287	0.000000	0.084550
HICKORY	277	0.000000	116.687870
MUSKRAT	543	0.000000	0.935020
MUSKRAT	480	0.000000	0.935020
OPOSSUM	219	0.000000	0.077560
PLUM	46	0.000000	0.351680
RABBIT	219	0.000000	2.518540
RACCOON	277	0.000000	0.104380
RACCOON	395	0.000000	0.083500
SNAPPING TURTLE	179	0.000000	0.004880
SQUIRREL	577	0.000000	0.983730
SQUIRREL	634	0.000000	0.841270
SWEET ACORNS	510	0.000000	1625.581110
TUBER	85	0.000000	1.965560
TUBER	60	0.000000	1.237660
TURKEY	181	0.000000	1.512300
TURKEY	146	0.000000	1.512300
VIBURNUM	**46**	**1.168170**	**1.168170**
WALNUT	897	0.000000	47.828480
** Total **		5.660092	2630.286660

** MACA-171 PRE-MAIZE GARDENING, WINTER SEASON

BEAR	363	0.000000	0.767250

BEAR	169	0.000000	0.670370
BEAVER	205	0.000000	0.016970
BEAVER	170	0.000000	0.016970
BITTER ACORNS	170	0.000000	603.492870
CHENOPODIUM SEEDS	**163**	**3.963038**	**201.030340**
DEER	118	0.000000	5.974140
DEER	90	0.000000	5.491850
DUCK	4178	0.000000	0.048230
FISH	63	0.000000	8.338970
HAWTHORN	**81**	**0.025120**	**0.025120**
HAZELNUT	1287	0.000000	0.084550
HICKORY	277	0.000000	116.687870
MUSKRAT	543	0.000000	0.935020
MUSKRAT	480	0.000000	0.935020
OPOSSUM	219	0.000000	0.077560
PLUM	46	0.000000	0.351680
RABBIT	**219**	**0.026741**	**2.518540**
RACCOON	277	0.000000	0.104380
RACCOON	395	0.000000	0.083500
SNAPPING TURTLE	179	0.000000	0.004880
SQUASH	**26**	**0.747477**	**789.230210**
SQUIRREL	577	0.000000	0.983730
SQUIRREL	634	0.000000	0.841270
SUNFLOWER	418	0.000000	158.256000
SWEET ACORNS	510	0.000000	1625.581110
TUBER	85	0.000000	1.965560
TUBER	60	0.000000	1.237660
TURKEY	181	0.000000	1.512300
TURKEY	146	0.000000	1.512300
VIBURNUM	**46**	**0.820255**	**1.168170**
WALNUT	897	0.000000	47.828480
** Total **		5.582631	3577.772870

** MACA-171 POST-MAIZE GARDENING, WINTER SEASON

BEAR	363	0.000000	0.767250
BEAR	169	0.000000	0.670370
BEAVER	205	0.000000	0.016970
BEAVER	170	0.000000	0.016970
BITTER ACORNS	170	0.000000	603.492870
CHENOPODIUM SEEDS	**163**	**3.963038**	**201.030340**
DEER	118	0.000000	5.974140
DEER	90	0.000000	5.491850
DUCK	4178	0.000000	0.048230
FISH	63	0.000000	8.338970
HAWTHORN	**81**	**0.025120**	**0.025120**
HAZELNUT	1287	0.000000	0.084550
HICKORY	277	0.000000	116.687870
MAIZE	83.7	0.000000	789.230210
MUSKRAT	543	0.000000	0.935020
MUSKRAT	480	0.000000	0.935020
OPOSSUM	219	0.000000	0.077560
PLUM	46	0.000000	0.351680
RABBIT	**219**	**0.026741**	**2.518540**
RACCOON	277	0.000000	0.104380
RACCOON	395	0.000000	0.083500
SNAPPING TURTLE	179	0.000000	0.004880
SQUASH	**26**	**0.747477**	**789.230210**
SQUIRREL	577	0.000000	0.983730

SQUIRREL	634	0.000000	0.841270
SUNFLOWER	418	0.000000	158.256000
SWEET ACORNS	510	0.000000	1625.581110
TUBER	85	0.000000	1.965560
TUBER	60	0.000000	1.237660
TURKEY	181	0.000000	1.512300
TURKEY	146	0.000000	1.512300
VIBURNUM	**46**	**0.820255**	**1.168170**
WALNUT	897	0.000000	47.828480
** Total **		5.562856	4367.003080

** MACA-000 FORAGING, FALL SEASON

BEAR	328	0.000000	0.771470
BEAR	431	0.000000	0.609100
BERRIES (RUBUS)	81	0.000000	0.077050
BLACKCHERRY	74	0.000000	77.045000
BLUEBERRIES	81	0.000000	0.406290
BOX TURTLE	600	0.000000	1.559210
BITTER ACORNS	160	0.000000	329.210440
CHENOPODIUM SEEDS	**153**	**3.188128**	**616.575730**
DEER	83	0.000000	1.998930
DEER	111	0.000000	0.879360
GRAPE	46	0.000000	0.494860
HAWTHORN	**65**	**0.077050**	**0.077050**
HAZELNUT	1277	0.000000	0.259330
HICKORY	247	0.000000	39.043320
OPOSSUM	184	0.000000	0.118940
OPOSSUM	284	0.000000	0.118940
PAWPAW	**12**	**4.444317**	**5.688060**
PLUM	28	0.000000	1.078630
RABBIT	184	0.000000	1.266190
RABBIT	284	0.000000	0.980850
RACCOON	242	0.000000	0.320150
RACCOON	398	0.000000	0.201400
SQUIRREL	542	0.000000	0.989120
SQUIRREL	1015	0.000000	0.780430
SWEET ACORNS	500	0.000000	937.651430
TUBER	60	0.000000	6.028540
TUBER	85	0.000000	1.116540
TURKEY	146	0.000000	0.728180
TURKEY	305	0.000000	0.440490
VIBURNUM	**28**	**2.955350**	**2.955350**
WALNUT	887	0.000000	146.693680
** Total **		10.664845	2176.164060

** MACA-000 PRE-MAIZE GARDENING, FALL SEASON

BEAR	328	0.000000	0.771470
BEAR	431	0.000000	0.609100
BERRIES (RUBUS)	81	0.000000	0.077050
BLACKCHERRY	74	0.000000	77.045000
BLUEBERRIES	81	0.000000	0.406290
BOX TURTLE	600	0.000000	1.559210
BITTER ACORNS	160	0.000000	329.210440
CHENOPODIUM SEEDS	**153**	**3.188128**	**616.575730**
DEER	83	0.000000	1.998930

DEER	111	0.000000	0.879360
GRAPE	46	0.000000	0.494860
HAWTHORN	65	0.000000	0.077050
HAZELNUT	**1277**	**0.077050**	**0.259330**
HICKORY	247	0.000000	39.043320
OPOSSUM	184	0.000000	0.118940
OPOSSUM	284	0.000000	0.118940
PAWPAW	**12**	**4.444317**	**5.688060**
PLUM	28	0.000000	1.078630
RABBIT	184	0.000000	1.266190
RABBIT	284	0.000000	0.980850
RACCOON	242	0.000000	0.320150
RACCOON	398	0.000000	0.201400
SQUIRREL	542	0.000000	0.989120
SQUIRREL	1015	0.000000	0.780430
SWEET ACORNS	500	0.000000	937.651430
TUBER	60	0.000000	6.028540
TUBER	85	0.000000	1.116540
TURKEY	146	0.000000	0.728180
TURKEY	305	0.000000	0.440490
VIBURNUM	**28**	**2.955350**	**2.955350**
WALNUT	887	0.000000	146.693680
** Total **		10.664845	2176.164060

** MACA-000 POST-MAIZE GARDENING, FALL SEASON

BEAR	328	0.000000	0.771470
BEAR	431	0.000000	0.609100
BERRIES (RUBUS)	81	0.000000	0.077050
BLACKCHERRY	74	0.000000	77.045000
BLUEBERRIES	81	0.000000	0.406290
BOX TURTLE	600	0.000000	1.559210
BITTER ACORNS	160	0.000000	329.210440
CHENOPODIUM SEEDS	**153**	**3.188128**	**616.575730**
DEER	83	0.000000	1.998930
DEER	111	0.000000	0.879360
GRAPE	46	0.000000	0.494860
HAWTHORN	**65**	**0.077050**	**0.077050**
HAZELNUT	1277	0.000000	0.259330
HICKORY	247	0.000000	39.043320
MAIZE	83.7	0.000000	2420.630630
OPOSSUM	184	0.000000	0.118940
OPOSSUM	284	0.000000	0.118940
PAWPAW	**12**	**4.444317**	**5.688060**
PLUM	28	0.000000	1.078630
RABBIT	184	0.000000	1.266190
RABBIT	284	0.000000	0.980850
RACCOON	242	0.000000	0.320150
RACCOON	398	0.000000	0.201400
SQUIRREL	542	0.000000	0.989120
SQUIRREL	1015	0.000000	0.780430
SWEET ACORNS	500	0.000000	937.651430
TUBER	60	0.000000	6.028540
TUBER	85	0.000000	1.116540
TURKEY	146	0.000000	0.728180
TURKEY	305	0.000000	0.440490
VIBURNUM	**28**	**2.955350**	**2.955350**
WALNUT	887	0.000000	146.693680

** Total **		10.664845	4596.794690

** MACA-000 FORAGING, SPRING SEASON

AMARANTH GREENS	44	0.000000	4.038240
BEAR	440	0.000000	0.576590
BEAR	**239**	**0.674060**	**0.674060**
BOX TURTLE	600	0.000000	1.559210
CHENOPODIUM GREENS	**44**	**0.562567**	**0.840720**
DEER	**97**	**0.867860**	**0.867860**
DEER	**160**	**1.837550**	**1.837550**
GREENS (OTHER)	100	0.000000	1.103280
MUSHROOM	110	0.000000	1.479250
OPOSSUM	269	0.000000	0.118940
OPOSSUM	289	0.000000	0.118940
POKEGREENS	**44**	**1.454520**	**1.454520**
RABBIT	269	0.000000	0.980850
RABBIT	289	0.000000	1.266190
RACCOON	395	0.000000	0.192090
RACCOON	430	0.000000	0.256110
SQUIRREL	1176	0.000000	0.572990
SQUIRREL	704	0.000000	0.845890
TUBER	**60**	**5.805340**	**5.805340**
TUBER	85	0.000000	3.796010
TURKEY	**248**	**0.076349**	**0.584630**
TURKEY	**216**	**0.728180**	**0.728180**
** Total **		12.006426	29.697440

** MACA-000 PRE-MAIZE GARDENING, SPRING SEASON

AMARANTH GREENS	44	0.000000	4.038240
BEAR	440	0.000000	0.576590
BEAR	**239**	**0.674060**	**0.674060**
BOX TURTLE	600	0.000000	1.559210
CHENOPODIUM GREENS	**44**	**0.562567**	**0.840720**
DEER	**97**	**0.867860**	**0.867860**
DEER	**160**	**1.837550**	**1.837550**
GREENS (OTHER)	100	0.000000	1.103280
MUSHROOM	110	0.000000	1.479250
OPOSSUM	269	0.000000	0.118940
OPOSSUM	289	0.000000	0.118940
POKEGREENS	**44**	**1.454520**	**1.454520**
RABBIT	269	0.000000	0.980850
RABBIT	289	0.000000	1.266190
RACCOON	395	0.000000	0.192090
RACCOON	430	0.000000	0.256110
SQUIRREL	1176	0.000000	0.572990
SQUIRREL	704	0.000000	0.845890
TUBER	**60**	**5.805340**	**5.805340**
TUBER	85	0.000000	3.796010
TURKEY	**248**	**0.076349**	**0.584630**
TURKEY	**216**	**0.728180**	**0.728180**
** Total **		12.006426	29.697440

** MACA-000 POST-MAIZE GARDENING, SPRING SEASON

AMARANTH GREENS	44	0.000000	4.038240
BEAR	440	0.000000	0.576590
BEAR	**239**	**0.674060**	**0.674060**
BOX TURTLE	600	0.000000	1.559210
CHENOPODIUM GREENS	**44**	**0.562567**	**0.840720**
DEER	**97**	**0.867860**	**0.867860**
DEER	**160**	**1.837550**	**1.837550**
GREENS (OTHER)	100	0.000000	1.103280
MUSHROOM	110	0.000000	1.479250
OPOSSUM	269	0.000000	0.118940
OPOSSUM	289	0.000000	0.118940
POKEGREENS	**44**	**1.454520**	**1.454520**
RABBIT	269	0.000000	0.980850
RABBIT	289	0.000000	1.266190
RACCOON	395	0.000000	0.192090
RACCOON	430	0.000000	0.256110
SQUIRREL	1176	0.000000	0.572990
SQUIRREL	704	0.000000	0.845890
TUBER	**60**	**5.805340**	**5.805340**
TUBER	85	0.000000	3.796010
TURKEY	**248**	**0.076349**	**0.584630**
TURKEY	**216**	**0.728180**	**0.728180**
** Total **		12.006426	29.697440

** MACA-000 FORAGING, SUMMER SEASON

AMARANTH GREENS	44	0.000000	4.038240
BEAR	475	0.000000	0.576590
BEAR	416	0.000000	0.609100
BERRIES (RUBUS)	65	0.000000	0.077050
BLACKCHERRY	**60**	**16.797619**	**77.045000**
BLUEBERRIES	65	0.000000	0.406290
BOX TURTLE	600	0.000000	1.559210
CHENOPODIUM GREENS	**44**	**0.696173**	**0.840720**
DEER	132	0.000000	0.867860
DEER	96	0.879360	0.879360
GRAPE	**28**	**0.494860**	**0.494860**
GREENS (OTHER)	100	0.000000	0.551640
OPOSSUM	304	0.000000	0.118940
OPOSSUM	269	0.000000	0.118940
RABBIT	304	0.000000	0.980850
RABBIT	269	0.000000	0.980850
RACCOON	430	0.000000	0.192090
RACCOON	378	0.000000	0.201400
SQUIRREL	1211	0.000000	0.572990
SQUIRREL	1000	0.000000	0.780430
TUBER	85	0.000000	5.805340
TUBER	60	0.000000	1.116540
TURKEY	283	0.000000	0.584630
TURKEY	290	0.000000	0.440490
** Total **		18.868012	99.839410

** MACA-000 PRE-MAIZE GARDENING, SUMMER SEASON

AMARANTH GREENS	44	0.000000	4.038240
BEAR	475	0.000000	0.576590
BEAR	416	0.000000	0.609100

BERRIES (RUBUS)	65	0.000000	0.077050
BLACKCHERRY	60	0.000000	77.045000
BLUEBERRIES	65	0.000000	0.406290
BOX TURTLE	600	0.000000	1.559210
CHENOPODIUM GREENS	44	0.000000	0.840720
DEER	132	0.000000	0.867860
DEER	96	0.000000	0.879360
GRAPE	28	0.000000	0.494860
GREENS (OTHER)	100	0.000000	0.551640
OPOSSUM	304	0.000000	0.118940
OPOSSUM	269	0.000000	0.118940
RABBIT	304	0.000000	0.980850
RABBIT	269	0.000000	0.980850
RACCOON	430	0.000000	0.192090
RACCOON	378	0.000000	0.201400
SQUASH	**13**	**15.599325**	**2420.630630**
SQUIRREL	1211	0.000000	0.572990
SQUIRREL	1000	0.000000	0.780430
TUBER	85	0.000000	5.805340
TUBER	60	0.000000	1.116540
TURKEY	283	0.000000	0.584630
TURKEY	290	0.000000	0.440490
** Total **		15.599325	2520.470040

** MACA-000 POST-MAIZE GARDENING, SUMMER SEASON

AMARANTH GREENS	44	0.000000	4.038240
BEAR	475	0.000000	0.576590
BEAR	416	0.000000	0.609100
BERRIES (RUBUS)	65	0.000000	0.077050
BLACKCHERRY	60	0.000000	77.045000
BLUEBERRIES	65	0.000000	0.406290
BOX TURTLE	600	0.000000	1.559210
CHENOPODIUM GREENS	44	0.000000	0.840720
DEER	132	0.000000	0.867860
DEER	96	0.000000	0.879360
GRAPE	28	0.000000	0.494860
GREENS (OTHER)	100	0.000000	0.551640
MAIZE	71.1	0.000000	2420.630630
OPOSSUM	304	0.000000	0.118940
OPOSSUM	269	0.000000	0.118940
RABBIT	304	0.000000	0.980850
RABBIT	269	0.000000	0.980850
RACCOON	430	0.000000	0.192090
RACCOON	378	0.000000	0.201400
SQUASH	**13**	**15.599325**	**2420.630630**
SQUIRREL	1211	0.000000	0.572990
SQUIRREL	1000	0.000000	0.780430
TUBER	85	0.000000	5.805340
TUBER	60	0.000000	1.116540
TURKEY	283	0.000000	0.584630
TURKEY	290	0.000000	0.440490
** Total **		15.599325	4941.100670

** MACA-000 FORAGING, WINTER SEASON

BEAR	363	0.000000	0.771470
BEAR	169	0.000000	0.674060
BITTER ACORNS	170	0.000000	329.210440
CHENOPODIUM SEEDS	**163**	**3.554519**	**616.575730**
DEER	118	0.000000	1.998930
DEER	90	0.000000	1.837550
HAWTHORN	**81**	**0.077050**	**0.077050**
HAZELNUT	1287	0.000000	0.259330
HICKORY	277	0.000000	39.043320
OPOSSUM	219	0.000000	0.237880
PLUM	46	0.000000	1.078630
RABBIT	**219**	**0.034023**	**2.532380**
RACCOON	277	0.000000	0.320150
RACCOON	395	0.000000	0.256110
SQUIRREL	577	0.000000	0.989120
SQUIRREL	634	0.000000	0.845890
SWEET ACORNS	510	0.000000	937.651430
TUBER	85	0.000000	6.028540
TUBER	60	0.000000	3.796010
TURKEY	181	0.000000	0.728180
TURKEY	146	0.000000	0.728180
VIBURNUM	**46**	**2.579550**	**2.955350**
WALNUT	897	0.000000	146.693680
** Total **		6.245142	2095.289410

** MACA-000 PRE-MAIZE GARDENING, WINTER SEASON

BEAR	363	0.000000	0.771470
BEAR	169	0.000000	0.674060
BITTER ACORNS	170	0.000000	329.210440
CHENOPODIUM SEEDS	**163**	**3.941137**	**616.575730**
DEER	118	0.000000	1.998930
DEER	90	0.000000	1.837550
HAWTHORN	**81**	**0.077050**	**0.077050**
HAZELNUT	1287	0.000000	0.259330
HICKORY	277	0.000000	39.043320
OPOSSUM	219	0.000000	0.237880
PLUM	46	0.000000	1.078630
RABBIT	**219**	**0.027674**	**2.532380**
RACCOON	277	0.000000	0.320150
RACCOON	395	0.000000	0.256110
SQUASH	**26**	**0.746707**	**2420.630630**
SQUIRREL	577	0.000000	0.989120
SQUIRREL	634	0.000000	0.845890
SUNFLOWER	418	0.000000	485.383500
SWEET ACORNS	510	0.000000	937.651430
TUBER	85	0.000000	6.028540
TUBER	60	0.000000	3.796010
TURKEY	181	0.000000	0.728180
TURKEY	146	0.000000	0.728180
VIBURNUM	**46**	**0.768250**	**2.955350**
WALNUT	897	0.000000	146.693680
** Total **		5.560818	5001.303540

** MACA-000 POST-MAIZE GARDENING, WINTER SEASON

BEAR	363	0.000000	0.771470
BEAR	169	0.000000	0.674060
BITTER ACORNS	170	0.000000	329.210440
CHENOPODIUM SEEDS	**163**	**3.941137**	**616.575730**
DEER	118	0.000000	1.998930
DEER	90	0.000000	1.837550
HAWTHORN	**81**	**0.077050**	**0.077050**
HAZELNUT	1287	0.000000	0.259330
HICKORY	277	0.000000	39.043320
MAIZE	83.7	0.000000	2420.630630
OPOSSUM	219	0.000000	0.237880
PLUM	46	0.000000	1.078630
RABBIT	**219**	**0.027674**	**2.532380**
RACCOON	277	0.000000	0.320150
RACCOON	395	0.000000	0.256110
SQUASH	**26**	**0.746707**	**2420.630630**
SQUIRREL	577	0.000000	0.989120
SQUIRREL	634	0.000000	0.845890
SUNFLOWER	418	0.000000	485.383500
SWEET ACORNS	510	0.000000	937.651430
TUBER	85	0.000000	6.028540
TUBER	60	0.000000	3.796010
TURKEY	181	0.000000	0.728180
TURKEY	146	0.000000	0.728180
VIBURNUM	**46**	**0.768250**	**2.955350**
WALNUT	897	0.000000	146.693680
** Total **		5.560818	7421.934170

** MACA-37 FORAGING, FALL (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	328	0.385730	0.385730
BEAR	475	0.288300	0.288300
BEAR	431	0.304550	0.304550
BLUEBERRIES	81	0.328390	0.328390
BOX TURTLE	600	1.039473	1.039473
DEER	83	2.046390	2.046390
HICKORY	247	79.940830	79.940830
PAWPAW	12	0.459740	0.459740
RABBIT	184	0.633090	0.633090
RABBIT	304	0.490425	0.490425
RABBIT	284	0.490425	0.490425
SQUIRREL	542	0.494560	0.494560
SQUIRREL	1211	0.286500	0.286500
SQUIRREL	1015	0.390210	0.390210
TURKEY	146	0.490175	0.490175
TURKEY	283	0.393540	0.393540
TURKEY	305	0.296515	0.296515
** Total **		88.758843	88.758843

** MACA-37 FORAGING, SPRING (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	363	0.385730	0.385730
BEAR	440	0.288300	0.288300
BEAR	239	0.337030	0.337030
BOX TURTLE	600	1.039473	1.039473
DEER	118	2.046390	2.046390
DEER	160	1.881185	1.881185
HICKORY	277	79.940830	79.940830

MUSHROOM	110	3.028750	3.028750
POKE GREENS	44	1.175620	1.175620
RABBIT	219	0.633090	0.633090
RABBIT	269	0.490425	0.490425
RABBIT	289	0.633090	0.633090
SQUIRREL	577	0.494560	0.494560
SQUIRREL	1176	0.286500	0.286500
SQUIRREL	704	0.422945	0.422945
TURKEY	181	0.490175	0.490175
TURKEY	248	0.393540	0.393540
TURKEY	216	0.490175	0.490175
** Total **		94.457808	94.457808

** MACA-37 FORAGING, SUMMER (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	475	0.288300	0.288300
BEAR	416	0.304550	0.304550
BEAR	239	0.337030	0.337030
BLUEBERRIES	65	0.328390	0.328390
BOX TURTLE	600	1.039473	1.039473
DEER	160	1.881185	1.881185
RABBIT	304	0.490425	0.490425
RABBIT	269	0.490425	0.490425
RABBIT	289	0.633090	0.633090
SQUIRREL	1211	0.286500	0.286500
SQUIRREL	1000	0.390210	0.390210
SQUIRREL	704	0.422945	0.422945
TURKEY	283	0.393540	0.393540
TURKEY	290	0.296515	0.296515
TURKEY	216	0.490175	0.490175
** Total **		8.072753	8.072753

** MACA-37 FORAGING, WINTER (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	363	0.385730	0.385730
BEAR	431	0.304550	0.304550
BEAR	169	0.337030	0.337030
BLUEBERRIES	81	0.328390	0.328390
DEER	118	2.046390	2.046390
DEER	90	1.881185	1.881185
HICKORY	277	79.940830	79.940830
RABBIT	219	0.633090	0.633090
RABBIT	284	0.490425	0.490425
RABBIT	219	0.633090	0.633090
SQUIRREL	577	0.494560	0.494560
SQUIRREL	1015	0.390210	0.390210
SQUIRREL	634	0.422945	0.422945
TURKEY	181	0.490175	0.490175
TURKEY	305	0.296515	0.296515
TURKEY	146	0.490175	0.490175
** Total **		89.565290	89.565290

** MACA-37 PRE-MAIZE GARDENING, FALL (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	328	0.385730	0.385730

BEAR	475	0.288300	0.288300
BEAR	431	0.304550	0.304550
BLUEBERRIES	81	0.328390	0.328390
BOX TURTLE	600	1.039473	1.039473
DEER	83	2.046390	2.046390
HICKORY	247	79.940830	79.940830
PAWPAW	12	0.459740	0.459740
RABBIT	184	0.633090	0.633090
RABBIT	304	0.490425	0.490425
RABBIT	284	0.490425	0.490425
SQUIRREL	542	0.494560	0.494560
SQUIRREL	1211	0.286500	0.286500
SQUIRREL	1015	0.390210	0.390210
TURKEY	146	0.490175	0.490175
TURKEY	283	0.393540	0.393540
TURKEY	305	0.296515	0.296515
** Total **		88.758843	88.758843

** MACA-37 PRE-MAIZE GARDENING, SPRING (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	363	0.385730	0.385730
BEAR	440	0.288300	0.288300
BEAR	239	0.337030	0.337030
BOX TURTLE	600	1.039473	1.039473
DEER	118	2.046390	2.046390
DEER	160	1.881185	1.881185
HICKORY	277	79.940830	79.940830
MUSHROOM	110	3.028750	3.028750
POKE GREENS	44	1.175620	1.175620
RABBIT	219	0.633090	0.633090
RABBIT	269	0.490425	0.490425
RABBIT	289	0.633090	0.633090
SQUIRREL	577	0.494560	0.494560
SQUIRREL	1176	0.286500	0.286500
SQUIRREL	704	0.422945	0.422945
TURKEY	181	0.490175	0.490175
TURKEY	248	0.393540	0.393540
TURKEY	216	0.490175	0.490175
** Total **		94.457808	94.457808

** MACA-37 PRE-MAIZE GARDENING, SUMMER (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	475	0.288300	0.288300
BEAR	416	0.304550	0.304550
BEAR	239	0.337030	0.337030
BLUEBERRIES	65	0.328390	0.328390
BOX TURTLE	600	1.039473	1.039473
DEER	160	1.881185	1.881185
RABBIT	304	0.490425	0.490425
RABBIT	269	0.490425	0.490425
RABBIT	289	0.633090	0.633090
SQUIRREL	1211	0.286500	0.286500
SQUIRREL	1000	0.390210	0.390210
SQUIRREL	704	0.422945	0.422945
TURKEY	283	0.393540	0.393540
TURKEY	290	0.296515	0.296515
TURKEY	216	0.490175	0.490175

** Total **		8.072753	8.072753

** MACA-37 PRE-MAIZE GARDENING, WINTER (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	363	0.385730	0.385730
BEAR	431	0.304550	0.304550
BEAR	169	0.337030	0.337030
BLUEBERRIES	81	0.328390	0.328390
DEER	118	2.046390	2.046390
DEER	90	1.881185	1.881185
HICKORY	277	79.940830	79.940830
RABBIT	219	0.633090	0.633090
RABBIT	284	0.490425	0.490425
RABBIT	219	0.633090	0.633090
SQUIRREL	577	0.494560	0.494560
SQUIRREL	1015	0.390210	0.390210
SQUIRREL	634	0.422945	0.422945
TURKEY	181	0.490175	0.490175
TURKEY	305	0.296515	0.296515
TURKEY	146	0.490175	0.490175
** Total **		89.565290	89.565290

** MACA-37 POST-MAIZE GARDENING, FALL (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	328	0.385730	0.385730
BEAR	475	0.288300	0.288300
BEAR	431	0.304550	0.304550
BLUEBERRIES	81	0.328390	0.328390
BOX TURTLE	600	1.039473	1.039473
DEER	83	2.046390	2.046390
HICKORY	247	79.940830	79.940830
PAWPAW	12	0.459740	0.459740
RABBIT	184	0.633090	0.633090
RABBIT	304	0.490425	0.490425
RABBIT	284	0.490425	0.490425
SQUIRREL	542	0.494560	0.494560
SQUIRREL	1211	0.286500	0.286500
SQUIRREL	1015	0.390210	0.390210
TURKEY	146	0.490175	0.490175
TURKEY	283	0.393540	0.393540
TURKEY	305	0.296515	0.296515
** Total **		88.758843	88.758843

** MACA-37 POST-MAIZE GARDENING, SPRING (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	363	0.385730	0.385730
BEAR	440	0.288300	0.288300
BEAR	239	0.337030	0.337030
BOX TURTLE	600	1.039473	1.039473
DEER	118	2.046390	2.046390
DEER	160	1.881185	1.881185
HICKORY	277	79.940830	79.940830
MUSHROOM	110	3.028750	3.028750
POKE GREENS	44	1.175620	1.175620
RABBIT	219	0.633090	0.633090
RABBIT	269	0.490425	0.490425

RABBIT	289	0.633090	0.633090
SQUIRREL	577	0.494560	0.494560
SQUIRREL	1176	0.286500	0.286500
SQUIRREL	704	0.422945	0.422945
TURKEY	181	0.490175	0.490175
TURKEY	248	0.393540	0.393540
TURKEY	216	0.490175	0.490175
** Total **		94.457808	94.457808

** MACA-37 POST-MAIZE GARDENING, SUMMER (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	475	0.288300	0.288300
BEAR	416	0.304550	0.304550
BEAR	239	0.337030	0.337030
BLUEBERRIES	65	0.328390	0.328390
BOX TURTLE	600	1.039473	1.039473
DEER	160	1.881185	1.881185
RABBIT	304	0.490425	0.490425
RABBIT	269	0.490425	0.490425
RABBIT	289	0.633090	0.633090
SQUIRREL	1211	0.286500	0.286500
SQUIRREL	1000	0.390210	0.390210
SQUIRREL	704	0.422945	0.422945
TURKEY	283	0.393540	0.393540
TURKEY	290	0.296515	0.296515
TURKEY	216	0.490175	0.490175
** Total **		8.072753	8.072753

** MACA-37 POST-MAIZE GARDENING, WINTER (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	363	0.385730	0.385730
BEAR	431	0.304550	0.304550
BEAR	169	0.337030	0.337030
BLUEBERRIES	81	0.328390	0.328390
DEER	118	2.046390	2.046390
DEER	90	1.881185	1.881185
HICKORY	277	79.940830	79.940830
RABBIT	219	0.633090	0.633090
RABBIT	284	0.490425	0.490425
RABBIT	219	0.633090	0.633090
SQUIRREL	577	0.494560	0.494560
SQUIRREL	1015	0.390210	0.390210
SQUIRREL	634	0.422945	0.422945
TURKEY	181	0.490175	0.490175
TURKEY	305	0.296515	0.296515
TURKEY	146	0.490175	0.490175
** Total **		89.565290	89.565290

** MACA-43 FORAGING, FALL (NO ACORNS OR SQUASH)

BEAR	328	0.000000	0.375475
BEAR	475	0.000000	0.280630
BEAR	431	0.000000	0.296450
BEAVER	170	0.000000	0.005670
BEAVER	205	0.000000	0.011340

BERRIES (RUBUS)	81	0.000000	0.053960
BLACK CHERRY	74	0.000000	53.955000
BLUEBERRIES	81	0.000000	0.259930
BOX TURTLE	600	0.000000	1.011834
CHENOPODIUM SEEDS	153	0.000000	431.791070
DEER	**83**	**1.980840**	**2.030985**
DEER	132	0.000000	0.303885
DEER	111	0.000000	0.307910
DUCK	4178	0.000000	0.117495
FISH	**28**	**5.330448**	**20.314885**
FISH	89	0.000000	20.314885
FISH	63	0.000000	20.314885
GRAPE	46	0.000000	0.346550
HAWTHORN	65	0.000000	0.053960
HAZELNUT	1277	0.000000	0.181610
HICKORY	247	0.000000	79.339040
MUSKRAT	480	0.000000	0.312390
MUSKRAT	543	0.000000	0.624780
MUSSEL	**40**	**0.573276**	**77.385560**
OPOSSUM	184	0.000000	0.041650
OPOSSUM	304	0.000000	0.041650
OPOSSUM	284	0.000000	0.041650
PAWPAW	**12**	**0.363900**	**0.363900**
PLUM	28	0.000000	0.755370
RABBIT	184	0.000000	0.616255
RABBIT	304	0.000000	0.477385
RABBIT	284	0.000000	0.477385
RACCOON	242	0.000000	0.112100
RACCOON	430	0.000000	0.067260
RACCOON	398	0.000000	0.070520
SNAPPING TURTLE	179	0.000000	0.011880
SOFTSHELL TURTLE	274	0.000000	0.010535
SQUIRREL	542	0.000000	0.481410
SQUIRREL	1211	0.000000	0.278875
SQUIRREL	1015	0.000000	0.379840
TERRAPIN	165	0.000000	0.279850
TUBER	60	0.000000	2.110910
TUBER	85	0.000000	2.423715
TURKEY	146	0.000000	0.573805
TURKEY	283	0.000000	0.460685
TURKEY	305	0.000000	0.347105
WALNUT	887	0.000000	102.730320
** Total **		8.248464	823.144234

** MACA-43 FORAGING, SPRING (NO ACORNS OR SQUASH)

AMARANTH GREENS	**44**	**1.966522**	**2.828000**
BEAR	363	0.000000	0.375475
BEAR	440	0.000000	0.280630
BEAR	239	0.000000	0.328070
BEAVER	205	0.000000	0.005670
BEAVER	170	0.000000	0.005670
BEAVER	205	0.000000	0.005670
BOX TURTLE	600	0.000000	1.011834
CHENOPODIUM GREENS	44	0.000000	0.588760
CHENOPODIUM SEEDS	163	0.000000	431.791070
DEER	118	0.000000	2.030985
DEER	97	0.000000	0.303885
DEER	160	0.000000	1.867025

DUCK	4178	0.000000	0.117495
FISH	63	0.000000	20.314885
FISH	**56**	**8.588686**	**20.314885**
GREENS (OTHER)	100	0.000000	0.772640
HAWTHORN	81	0.000000	0.053960
HAZELNUT	1287	0.000000	0.181610
HICKORY	277	0.000000	79.339040
MUSHROOM	110	0.000000	3.005950
MUSKRAT	543	0.000000	0.312390
MUSKRAT	480	0.000000	0.312390
MUSKRAT	543	0.000000	0.312390
OPOSSUM	219	0.000000	0.041650
OPOSSUM	269	0.000000	0.041650
OPOSSUM	289	0.000000	0.041650
PLUM	46	0.000000	0.755370
POKE GREENS	44	0.000000	0.930530
RABBIT	219	0.000000	0.616255
RABBIT	269	0.000000	0.477385
RABBIT	289	0.000000	0.616255
RACCOON	277	0.000000	0.112100
RACCOON	395	0.000000	0.067260
RACCOON	430	0.000000	0.089680
SNAPPING TURTLE	179	0.000000	0.011880
SOFTSHELL TURTLE	274	0.000000	0.010535
SQUIRREL	577	0.000000	0.481410
SQUIRREL	1176	0.000000	0.278875
SQUIRREL	704	0.000000	0.411700
TERRAPIN	165	0.000000	0.279850
TUBER	85	0.000000	2.110910
TUBER	60	0.000000	2.032755
TUBER	85	0.000000	1.329180
TURKEY	181	0.000000	0.573805
TURKEY	248	0.000000	0.460685
TURKEY	216	0.000000	0.573805
WALNUT	897	0.000000	102.730320
** Total **		10.555208	681.535874

** MACA-43 FORAGING, SUMMER (NO ACORNS OR SQUASH)

AMARANTH GREENS	44	0.000000	2.828000
BEAR	475	0.000000	0.280630
BEAR	416	0.000000	0.296450
BEAR	239	0.000000	0.328070
BEAVER	205	0.000000	0.005670
BEAVER	170	0.000000	0.005670
BEAVER	205	0.000000	0.005670
BERRIES (RUBUS)	65	0.000000	0.053960
BLACK CHERRY	60	0.000000	53.955000
BLUEBERRIES	65	0.000000	0.259930
BOX TURTLE	600	0.000000	1.011834
CHENOPODIUM GREENS	**44**	**0.554449**	**0.588760**
DEER	132	0.000000	0.303885
DEER	96	0.000000	0.307910
DEER	160	0.000000	1.867025
DUCK	4178	0.000000	0.117495
FISH	89	0.000000	20.314885
FISH	**28**	**8.556372**	**20.314885**
GRAPE	28	0.000000	0.346550
GREENS (OTHER)	100	0.000000	0.386320

MUSKRAT	543	0.000000	0.312390
MUSKRAT	480	0.000000	0.312390
MUSKRAT	543	0.000000	0.312390
MUSSEL	**40**	**0.345026**	**77.385560**
OPOSSUM	304	0.000000	0.041650
OPOSSUM	269	0.000000	0.041650
OPOSSUM	289	0.000000	0.041650
RABBIT	304	0.000000	0.477385
RABBIT	269	0.000000	0.477385
RABBIT	289	0.000000	0.616255
RACCOON	430	0.000000	0.067260
RACCOON	378	0.000000	0.070520
RACCOON	430	0.000000	0.089680
SNAPPING TURTLE	179	0.000000	0.011880
SOFTSHELL TURTLE	274	0.000000	0.010535
SQUIRREL	1211	0.000000	0.278875
SQUIRREL	1000	0.000000	0.379840
SQUIRREL	704	0.000000	0.411700
TERRAPIN	165	0.000000	0.279850
TUBER	85	0.000000	2.032755
TUBER	**60**	**0.390960**	**0.390960**
TUBER	85	0.000000	1.329180
TURKEY	283	0.000000	0.460685
TURKEY	290	0.000000	0.347105
TURKEY	216	0.000000	0.573805
** Total **		9.846807	190.331934

** MACA-43 FORAGING, WINTER (NO ACORNS OR SQUASH)

BEAR	363	0.000000	0.375475
BEAR	431	0.000000	0.296450
BEAR	169	0.000000	0.328070
BEAVER	205	0.000000	0.011340
BEAVER	170	0.000000	0.005670
BERRIES (RUBUS)	**81**	**0.053960**	**0.053960**
BLACK CHERRY	**74**	**0.722023**	**53.955000**
BLUEBERRIES	**81**	**0.259932**	**0.259930**
CHENOPODIUM SEEDS	**163**	**3.902621**	**431.791070**
DEER	118	0.000000	2.030985
DEER	111	0.000000	0.307910
DEER	**90**	**0.558200**	**1.867025**
DUCK	4178	0.000000	0.117495
FISH	63	0.000000	40.629770
GRAPE	46	0.000000	0.346550
HAWTHORN	**81**	**0.053960**	**0.053960**
HAZELNUT	1287	0.000000	0.181610
HICKORY	277	0.000000	79.339040
MUSKRAT	543	0.000000	0.624780
MUSKRAT	480	0.000000	0.312390
OPOSSUM	219	0.000000	0.041650
OPOSSUM	284	0.000000	0.041650
OPOSSUM	219	0.000000	0.041650
PLUM	**46**	**0.755370**	**0.755370**
RABBIT	219	0.000000	0.616255
RABBIT	284	0.000000	0.477385
RABBIT	219	0.000000	0.616255
RACCOON	277	0.000000	0.112100
RACCOON	398	0.000000	0.070520
RACCOON	395	0.000000	0.089680

SNAPPING TURTLE	179	0.000000	0.011880
SQUIRREL	577	0.000000	0.481410
SQUIRREL	1015	0.000000	0.379840
SQUIRREL	634	0.000000	0.411700
TUBER	85	0.000000	2.501870
TUBER	60	0.000000	1.329180
TURKEY	181	0.000000	0.573805
TURKEY	305	0.000000	0.347105
TURKEY	146	0.000000	0.573805
WALNUT	897	0.000000	102.730320
** Total **		6.306066	725.091910

** MACA-43 PRE-MAIZE GARDENING, FALL (NO ACORNS OR SQUASH)

BEAR	328	0.000000	0.375475
BEAR	475	0.000000	0.280630
BEAR	431	0.000000	0.296450
BEAVER	170	0.000000	0.005670
BEAVER	205	0.000000	0.011340
BERRIES (RUBUS)	81	0.000000	0.053960
BLACK CHERRY	74	0.000000	53.955000
BLUEBERRIES	81	0.000000	0.259930
BOX TURTLE	600	0.000000	1.011834
CHENOPODIUM SEEDS	153	0.000000	431.791070
DEER	**83**	**1.980840**	**2.030985**
DEER	132	0.000000	0.303885
DEER	111	0.000000	0.307910
DUCK	4178	0.000000	0.117495
FISH	**28**	**5.330448**	**20.314885**
FISH	89	0.000000	20.314885
FISH	63	0.000000	20.314885
GRAPE	46	0.000000	0.346550
HAWTHORN	65	0.000000	0.053960
HAZELNUT	1277	0.000000	0.181610
HICKORY	247	0.000000	79.339040
MUSKRAT	480	0.000000	0.312390
MUSKRAT	543	0.000000	0.624780
MUSSEL	**40**	**0.573276**	**77.385560**
OPOSSUM	184	0.000000	0.041650
OPOSSUM	304	0.000000	0.041650
OPOSSUM	284	0.000000	0.041650
PAWPAW	**12**	**0.363900**	**0.363900**
PLUM	28	0.000000	0.755370
RABBIT	184	0.000000	0.616255
RABBIT	304	0.000000	0.477385
RABBIT	284	0.000000	0.477385
RACCOON	242	0.000000	0.112100
RACCOON	430	0.000000	0.067260
RACCOON	398	0.000000	0.070520
SNAPPING TURTLE	179	0.000000	0.011880
SOFTSHELL TURTLE	274	0.000000	0.010535
SQUIRREL	542	0.000000	0.481410
SQUIRREL	1211	0.000000	0.278875
SQUIRREL	1015	0.000000	0.379840
SUNFLOWER	410	0.000000	339.916500
TERRAPIN	165	0.000000	0.279850
TUBER	60	0.000000	2.110910
TUBER	85	0.000000	2.423715
TURKEY	146	0.000000	0.573805

TURKEY	283	0.000000	0.460685
TURKEY	305	0.000000	0.347105
WALNUT	887	0.000000	102.730320
** Total **		8.248464	1163.060734

** MACA-43 PRE-MAIZE GARDENING, SPRING (NO ACORNS OR SQUASH)

AMARANTH GREENS	**44**	**1.966522**	**2.828000**
BEAR	363	0.000000	0.375475
BEAR	440	0.000000	0.280630
BEAR	239	0.000000	0.328070
BEAVER	205	0.000000	0.005670
BEAVER	170	0.000000	0.005670
BEAVER	205	0.000000	0.005670
BOX TURTLE	600	0.000000	1.011834
CHENOPODIUM GREENS	44	0.000000	0.588760
CHENOPODIUM SEEDS	163	0.000000	431.791070
DEER	118	0.000000	2.030985
DEER	97	0.000000	0.303885
DEER	160	0.000000	1.867025
DUCK	4178	0.000000	0.117495
FISH	63	0.000000	20.314885
FISH	**56**	**8.588686**	**20.314885**
GREENS (OTHER)	100	0.000000	0.772640
HAWTHORN	81	0.000000	0.053960
HAZELNUT	1287	0.000000	0.181610
HICKORY	277	0.000000	79.339040
MUSHROOM	110	0.000000	3.005950
MUSKRAT	543	0.000000	0.312390
MUSKRAT	480	0.000000	0.312390
MUSKRAT	543	0.000000	0.312390
OPOSSUM	219	0.000000	0.041650
OPOSSUM	269	0.000000	0.041650
OPOSSUM	289	0.000000	0.041650
PLUM	46	0.000000	0.755370
POKE GREENS	44	0.000000	0.930530
RABBIT	219	0.000000	0.616255
RABBIT	269	0.000000	0.477385
RABBIT	289	0.000000	0.616255
RACCOON	277	0.000000	0.112100
RACCOON	395	0.000000	0.067260
RACCOON	430	0.000000	0.089680
SNAPPING TURTLE	179	0.000000	0.011880
SOFTSHELL TURTLE	274	0.000000	0.010535
SQUIRREL	577	0.000000	0.481410
SQUIRREL	1176	0.000000	0.278875
SQUIRREL	704	0.000000	0.411700
SUNFLOWER	418	0.000000	339.916500
TERRAPIN	165	0.000000	0.279850
TUBER	85	0.000000	2.110910
TUBER	60	0.000000	2.032755
TUBER	85	0.000000	1.329180
TURKEY	181	0.000000	0.573805
TURKEY	248	0.000000	0.460685
TURKEY	216	0.000000	0.573805
WALNUT	897	0.000000	102.730320
** Total **		10.555208	1021.452374

** MACA-43 PRE-MAIZE GARDENING, SUMMER (NO ACORNS OR SQUASH)

AMARANTH GREENS	44	0.000000	2.828000
BEAR	475	0.000000	0.280630
BEAR	416	0.000000	0.296450
BEAR	239	0.000000	0.328070
BEAVER	205	0.000000	0.005670
BEAVER	170	0.000000	0.005670
BEAVER	205	0.000000	0.005670
BERRIES (RUBUS)	65	0.000000	0.053960
BLACK CHERRY	60	0.000000	53.955000
BLUEBERRIES	65	0.000000	0.259930
BOX TURTLE	600	0.000000	1.011834
CHENOPODIUM GREENS	**44**	**0.554449**	**0.588760**
DEER	132	0.000000	0.303885
DEER	96	0.000000	0.307910
DEER	160	0.000000	1.867025
DUCK	4178	0.000000	0.117495
FISH	89	0.000000	20.314885
FISH	**28**	**8.556372**	**20.314885**
GRAPE	28	0.000000	0.346550
GREENS (OTHER)	100	0.000000	0.386320
MUSKRAT	543	0.000000	0.312390
MUSKRAT	480	0.000000	0.312390
MUSKRAT	543	0.000000	0.312390
MUSSEL	**40**	**0.345026**	**77.385560**
OPOSSUM	304	0.000000	0.041650
OPOSSUM	269	0.000000	0.041650
OPOSSUM	289	0.000000	0.041650
RABBIT	304	0.000000	0.477385
RABBIT	269	0.000000	0.477385
RABBIT	289	0.000000	0.616255
RACCOON	430	0.000000	0.067260
RACCOON	378	0.000000	0.070520
RACCOON	430	0.000000	0.089680
SNAPPING TURTLE	179	0.000000	0.011880
SOFTSHELL TURTLE	274	0.000000	0.010535
SQUIRREL	1211	0.000000	0.278875
SQUIRREL	1000	0.000000	0.379840
SQUIRREL	704	0.000000	0.411700
TERRAPIN	165	0.000000	0.279850
TUBER	85	0.000000	2.032755
TUBER	**60**	**0.390960**	**0.390960**
TUBER	85	0.000000	1.329180
TURKEY	283	0.000000	0.460685
TURKEY	290	0.000000	0.347105
TURKEY	216	0.000000	0.573805
** Total **		9.846807	190.331934

** MACA-43 PRE-MAIZE GARDENING, WINTER (NO ACORNS OR SQUASH)

BEAR	363	0.000000	0.375475
BEAR	431	0.000000	0.296450
BEAR	169	0.000000	0.328070
BEAVER	205	0.000000	0.011340
BEAVER	170	0.000000	0.005670
BERRIES (RUBUS)	**81**	**0.053960**	**0.053960**
BLACK CHERRY	**74**	**0.722023**	**53.955000**

BLUEBERRIES	**81**	**0.259930**	**0.259930**
CHENOPODIUM SEEDS	**163**	**3.902621**	**431.791070**
DEER	118	0.000000	2.030985
DEER	111	0.000000	0.307910
DEER	**90**	**0.558200**	**1.867025**
DUCK	4178	0.000000	0.117495
FISH	63	0.000000	40.629770
GRAPE	46	0.000000	0.346550
HAWTHORN	**81**	**0.053960**	**0.053960**
HAZELNUT	1287	0.000000	0.181610
HICKORY	277	0.000000	79.339040
MUSKRAT	543	0.000000	0.624780
MUSKRAT	480	0.000000	0.312390
OPOSSUM	219	0.000000	0.041650
OPOSSUM	284	0.000000	0.041650
OPOSSUM	219	0.000000	0.041650
PLUM	**46**	**0.755370**	**0.755370**
RABBIT	219	0.000000	0.616255
RABBIT	284	0.000000	0.477385
RABBIT	219	0.000000	0.616255
RACCOON	277	0.000000	0.112100
RACCOON	398	0.000000	0.070520
RACCOON	395	0.000000	0.089680
SNAPPING TURTLE	179	0.000000	0.011880
SQUIRREL	577	0.000000	0.481410
SQUIRREL	1015	0.000000	0.379840
SQUIRREL	634	0.000000	0.411700
SUNFLOWER	418	0.000000	339.916500
TUBER	85	0.000000	2.501870
TUBER	60	0.000000	1.329180
TURKEY	181	0.000000	0.573805
TURKEY	305	0.000000	0.347105
TURKEY	146	0.000000	0.573805
WALNUT	897	0.000000	102.730320
** Total **		6.306064	1065.008410

** MACA-43 POST-MAIZE GARDENING, FALL (NO ACORNS OR SQUASH)

BEAR	328	0.000000	0.375475
BEAR	475	0.000000	0.280630
BEAR	431	0.000000	0.296450
BEAVER	170	0.000000	0.005670
BEAVER	205	0.000000	0.011340
BERRIES (RUBUS)	81	0.000000	0.053960
BLACK CHERRY	74	0.000000	53.955000
BLUEBERRIES	81	0.000000	0.259930
BOX TURTLE	600	0.000000	1.011834
CHENOPODIUM SEEDS	153	0.000000	431.791070
DEER	**83**	**1.980840**	**2.030985**
DEER	132	0.000000	0.303885
DEER	111	0.000000	0.307910
DUCK	4178	0.000000	0.117495
FISH	**28**	**5.330448**	**20.314885**
FISH	89	0.000000	20.314885
FISH	63	0.000000	20.314885
GRAPE	46	0.000000	0.346550
HAWTHORN	65	0.000000	0.053960
HAZELNUT	1277	0.000000	0.181610
HICKORY	247	0.000000	79.339040

MAIZE	71	0.000000	847.589885
MAIZE	84	0.000000	847.589885
MUSKRAT	480	0.000000	0.312390
MUSKRAT	543	0.000000	0.624780
MUSSEL	**40**	**0.573276**	**77.385560**
OPOSSUM	184	0.000000	0.041650
OPOSSUM	304	0.000000	0.041650
OPOSSUM	284	0.000000	0.041650
PAWPAW	**12**	**0.363900**	**0.363900**
PLUM	28	0.000000	0.755370
RABBIT	184	0.000000	0.616255
RABBIT	304	0.000000	0.477385
RABBIT	284	0.000000	0.477385
RACCOON	242	0.000000	0.112100
RACCOON	430	0.000000	0.067260
RACCOON	398	0.000000	0.070520
SNAPPING TURTLE	179	0.000000	0.011880
SOFTSHELL TURTLE	274	0.000000	0.010535
SQUIRREL	542	0.000000	0.481410
SQUIRREL	1211	0.000000	0.278875
SQUIRREL	1015	0.000000	0.379840
SUNFLOWER	410	0.000000	339.916500
TERRAPIN	165	0.000000	0.279850
TUBER	60	0.000000	2.110910
TUBER	85	0.000000	2.423715
TURKEY	146	0.000000	0.573805
TURKEY	283	0.000000	0.460685
TURKEY	305	0.000000	0.347105
WALNUT	887	0.000000	102.730320
** Total **		8.248464	2858.240504

** MACA-43 POST-MAIZE GARDENING, SPRING (NO ACORNS OR SQUASH)

AMARANTH GREENS	**44**	**2.298642**	**2.828000**
BEAR	363	0.000000	0.375475
BEAR	440	0.000000	0.280630
BEAR	239	0.000000	0.328070
BEAVER	205	0.000000	0.005670
BEAVER	170	0.000000	0.005670
BEAVER	205	0.000000	0.005670
BOX TURTLE	600	0.000000	1.011834
CHENOPODIUM GREENS	44	0.000000	0.588760
CHENOPODIUM SEEDS	163	0.000000	431.791070
DEER	118	0.000000	2.030985
DEER	97	0.000000	0.303885
DEER	160	0.000000	1.867025
DUCK	4178	0.000000	0.117495
FISH	63	0.000000	20.314885
FISH	56	0.000000	20.314885
GREENS (OTHER)	100	0.000000	0.772640
HAWTHORN	81	0.000000	0.053960
HAZELNUT	1287	0.000000	0.181610
HICKORY	277	0.000000	79.339040
MAIZE	**84**	**3.692821**	**847.589885**
MUSHROOM	110	0.000000	3.005950
MUSKRAT	543	0.000000	0.312390
MUSKRAT	480	0.000000	0.312390
MUSKRAT	543	0.000000	0.312390
OPOSSUM	219	0.000000	0.041650

OPOSSUM	269	0.000000	0.041650
OPOSSUM	289	0.000000	0.041650
PLUM	46	0.000000	0.755370
POKE GREENS	44	0.000000	0.930530
RABBIT	219	0.000000	0.616255
RABBIT	269	0.000000	0.477385
RABBIT	289	0.000000	0.616255
RACCOON	277	0.000000	0.112100
RACCOON	395	0.000000	0.067260
RACCOON	430	0.000000	0.089680
SNAPPING TURTLE	179	0.000000	0.011880
SOFTSHELL TURTLE	274	0.000000	0.010535
SQUIRREL	577	0.000000	0.481410
SQUIRREL	1176	0.000000	0.278875
SQUIRREL	704	0.000000	0.411700
SUNFLOWER	418	0.000000	339.916500
TERRAPIN	165	0.000000	0.279850
TUBER	85	0.000000	2.110910
TUBER	60	0.000000	2.032755
TUBER	85	0.000000	1.329180
TURKEY	181	0.000000	0.573805
TURKEY	248	0.000000	0.460685
TURKEY	216	0.000000	0.573805
WALNUT	897	0.000000	102.730320
** Total **		5.991463	1869.042259

** MACA-43 POST-MAIZE GARDENING, SUMMER (NO ACORNS OR SQUASH)

AMARANTH GREENS	44	0.000000	2.828000
BEAR	475	0.000000	0.280630
BEAR	416	0.000000	0.296450
BEAR	239	0.000000	0.328070
BEAVER	205	0.000000	0.005670
BEAVER	170	0.000000	0.005670
BEAVER	205	0.000000	0.005670
BERRIES (RUBUS)	65	0.000000	0.053960
BLACK CHERRY	60	0.000000	53.955000
BLUEBERRIES	65	0.000000	0.259930
BOX TURTLE	600	0.000000	1.011834
CHENOPODIUM GREENS	**44**	**0.554449**	**0.588760**
DEER	132	0.000000	0.303885
DEER	96	0.000000	0.307910
DEER	160	0.000000	1.867025
DUCK	4178	0.000000	0.117495
FISH	89	0.000000	20.314885
FISH	**28**	**8.556372**	**20.314885**
GRAPE	28	0.000000	0.346550
GREENS (OTHER)	100	0.000000	0.386320
MAIZE	71	0.000000	847.589885
MUSKRAT	543	0.000000	0.312390
MUSKRAT	480	0.000000	0.312390
MUSKRAT	543	0.000000	0.312390
MUSSEL	**40**	**0.345026**	**77.385560**
OPOSSUM	304	0.000000	0.041650
OPOSSUM	269	0.000000	0.041650
OPOSSUM	289	0.000000	0.041650
RABBIT	304	0.000000	0.477385
RABBIT	269	0.000000	0.477385
RABBIT	289	0.000000	0.616255

RACCOON	430	0.000000	0.067260
RACCOON	378	0.000000	0.070520
RACCOON	430	0.000000	0.089680
SNAPPING TURTLE	179	0.000000	0.011880
SOFTSHELL TURTLE	274	0.000000	0.010535
SQUIRREL	1211	0.000000	0.278875
SQUIRREL	1000	0.000000	0.379840
SQUIRREL	704	0.000000	0.411700
TERRAPIN	165	0.000000	0.279850
TUBER	85	0.000000	2.032755
TUBER	**60**	**0.390960**	**0.390960**
TUBER	85	0.000000	1.329180
TURKEY	283	0.000000	0.460685
TURKEY	290	0.000000	0.347105
TURKEY	216	0.000000	0.573805
** Total **		9.846807	1037.921819

** MACA-43 POST-MAIZE GARDENING, WINTER (NO ACORNS OR SQUASH)

BEAR	363	0.000000	0.375475
BEAR	431	0.000000	0.296450
BEAR	169	0.000000	0.328070
BEAVER	205	0.000000	0.011340
BEAVER	170	0.000000	0.005670
BERRIES (RUBUS)	**81**	**0.053960**	**0.053960**
BLACK CHERRY	**74**	**0.722023**	**53.955000**
BLUEBERRIES	**81**	**0.259930**	**0.259930**
CHENOPODIUM SEEDS	**163**	**3.902621**	**431.791070**
DEER	118	0.000000	2.030985
DEER	111	0.000000	0.307910
DEER	**90**	**0.558200**	**1.867025**
DUCK	4178	0.000000	0.117495
FISH	63	0.000000	40.629770
GRAPE	46	0.000000	0.346550
HAWTHORN	**81**	**0.053960**	**0.053960**
HAZELNUT	1287	0.000000	0.181610
HICKORY	277	0.000000	79.339040
MAIZE	84	0.000000	1695.179770
MUSKRAT	543	0.000000	0.624780
MUSKRAT	480	0.000000	0.312390
OPOSSUM	219	0.000000	0.041650
OPOSSUM	284	0.000000	0.041650
OPOSSUM	219	0.000000	0.041650
PLUM	**46**	**0.755370**	**0.755370**
RABBIT	219	0.000000	0.616255
RABBIT	284	0.000000	0.477385
RABBIT	219	0.000000	0.616255
RACCOON	277	0.000000	0.112100
RACCOON	398	0.000000	0.070520
RACCOON	395	0.000000	0.089680
SNAPPING TURTLE	179	0.000000	0.011880
SQUIRREL	577	0.000000	0.481410
SQUIRREL	1015	0.000000	0.379840
SQUIRREL	634	0.000000	0.411700
SUNFLOWER	418	0.000000	339.916500
TUBER	85	0.000000	2.501870
TUBER	60	0.000000	1.329180
TURKEY	181	0.000000	0.573805
TURKEY	305	0.000000	0.347105

TURKEY	146	0.000000	0.573805
WALNUT	897	0.000000	102.730320
** Total **		6.306064	2760.188180

** MACA-65 FORAGING, FALL (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	328	0.385735	0.385735
BEAR	475	0.288300	0.288300
BEAR	431	0.304550	0.304550
BLUEBERRIES	81	0.308810	0.308810
BOX TURTLE	600	1.039474	1.039474
DEER	83	2.178650	2.178650
HICKORY	247	85.107450	85.107450
PAWPAW	12	0.432330	0.432330
RABBIT	184	0.633090	0.633090
RABBIT	304	0.490425	0.490425
RABBIT	284	0.490425	0.490425
SQUIRREL	542	0.494560	0.494560
SQUIRREL	1211	0.286500	0.286500
SQUIRREL	1015	0.390210	0.390210
TURKEY	146	0.521855	0.521855
TURKEY	283	0.418975	0.418975
TURKEY	305	0.315680	0.315680
** Total **		94.087019	94.087019

** MACA-65 FORAGING, SPRING (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	363	0.385735	0.385735
BEAR	440	0.288300	0.288300
BEAR	239	0.337030	0.337030
BOX TURTLE	600	1.039474	1.039474
DEER	118	2.178650	2.178650
DEER	160	2.002770	2.002770
HICKORY	277	85.107450	85.107450
MUSHROOM	110	3.224500	3.224500
POKE GREENS	44	1.105540	1.105540
RABBIT	219	0.633090	0.633090
RABBIT	269	0.490425	0.490425
RABBIT	289	0.633090	0.633090
SQUIRREL	577	0.494560	0.494560
SQUIRREL	1176	0.286500	0.286500
SQUIRREL	704	0.422945	0.422945
TURKEY	181	0.521855	0.521855
TURKEY	248	0.418975	0.418975
TURKEY	216	0.521855	0.521855
** Total **		100.092744	100.092744

** MACA-65 FORAGING, SUMMER (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	475	0.288300	0.288300
BEAR	416	0.304550	0.304550
BEAR	239	0.337030	0.337030
BLUEBERRIES	65	0.308810	0.308810
BOX TURTLE	600	1.039474	1.039474
DEER	160	2.002770	2.002770

RABBIT	304	0.490425	0.490425
RABBIT	269	0.490425	0.490425
RABBIT	289	0.633090	0.633090
SQUIRREL	1211	0.286500	0.286500
SQUIRREL	1000	0.390210	0.390210
SQUIRREL	704	0.422945	0.422945
TURKEY	283	0.418975	0.418975
TURKEY	290	0.315680	0.315680
TURKEY	216	0.521855	0.521855
** Total **		8.251039	8.251039

** MACA-65 FORAGING, WINTER (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	363	0.385735	0.385735
BEAR	431	0.304550	0.304550
BEAR	169	0.337030	0.337030
BLUEBERRIES	81	0.308810	0.308810
DEER	118	2.178650	2.178650
DEER	90	2.002770	2.002770
HICKORY	277	85.107450	85.107450
RABBIT	219	0.633090	0.633090
RABBIT	284	0.490425	0.490425
RABBIT	219	0.633090	0.633090
SQUIRREL	577	0.494560	0.494560
SQUIRREL	1015	0.390210	0.390210
SQUIRREL	634	0.422945	0.422945
TURKEY	181	0.521855	0.521855
TURKEY	305	0.315680	0.315680
TURKEY	146	0.521855	0.521855
** Total **		95.048705	95.048705

** MACA-65 PRE-MAIZE GARDENING, FALL (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	328	0.385735	0.385735
BEAR	475	0.288300	0.288300
BEAR	431	0.304550	0.304550
BLUEBERRIES	81	0.308810	0.308810
BOX TURTLE	600	1.039474	1.039474
DEER	83	2.178650	2.178650
HICKORY	247	85.107450	85.107450
PAWPAW	12	0.432330	0.432330
RABBIT	184	0.633090	0.633090
RABBIT	304	0.490425	0.490425
RABBIT	284	0.490425	0.490425
SQUIRREL	542	0.494560	0.494560
SQUIRREL	1211	0.286500	0.286500
SQUIRREL	1015	0.390210	0.390210
TURKEY	146	0.521855	0.521855
TURKEY	283	0.418975	0.418975
TURKEY	305	0.315680	0.315680
** Total **		94.087019	94.087019

** MACA-65 PRE-MAIZE GARDENING, SPRING (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	363	0.385735	0.385735

BEAR	440	0.288300	0.288300
BEAR	239	0.337030	0.337030
BOX TURTLE	600	1.039474	1.039474
DEER	118	2.178650	2.178650
DEER	160	2.002770	2.002770
HICKORY	277	85.107450	85.107450
MUSHROOM	110	3.224500	3.224500
POKE GREENS	44	1.105540	1.105540
RABBIT	219	0.633090	0.633090
RABBIT	269	0.490425	0.490425
RABBIT	289	0.633090	0.633090
SQUIRREL	577	0.494560	0.494560
SQUIRREL	1176	0.286500	0.286500
SQUIRREL	704	0.422945	0.422945
TURKEY	181	0.521855	0.521855
TURKEY	248	0.418975	0.418975
TURKEY	216	0.521855	0.521855
** Total **		100.092744	100.092744

** MACA-65 PRE-MAIZE GARDENING, SUMMER (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	475	0.288300	0.288300
BEAR	416	0.304550	0.304550
BEAR	239	0.337030	0.337030
BLUEBERRIES	65	0.308810	0.308810
BOX TURTLE	600	1.039474	1.039474
DEER	160	2.002770	2.002770
RABBIT	304	0.490425	0.490425
RABBIT	269	0.490425	0.490425
RABBIT	289	0.633090	0.633090
SQUIRREL	1211	0.286500	0.286500
SQUIRREL	1000	0.390210	0.390210
SQUIRREL	704	0.422945	0.422945
TURKEY	283	0.418975	0.418975
TURKEY	290	0.315680	0.315680
TURKEY	216	0.521855	0.521855
** Total **		8.251039	8.251039

** MACA-65 PRE-MAIZE GARDENING, WINTER (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	363	0.385735	0.385735
BEAR	431	0.304550	0.304550
BEAR	169	0.337030	0.337030
BLUEBERRIES	81	0.308810	0.308810
DEER	118	2.178650	2.178650
DEER	90	2.002770	2.002770
HICKORY	277	85.107450	85.107450
RABBIT	219	0.633090	0.633090
RABBIT	284	0.490425	0.490425
RABBIT	219	0.633090	0.633090
SQUIRREL	577	0.494560	0.494560
SQUIRREL	1015	0.390210	0.390210
SQUIRREL	634	0.422945	0.422945
TURKEY	181	0.521855	0.521855
TURKEY	305	0.315680	0.315680
TURKEY	146	0.521855	0.521855

** Total **		95.048705	95.048705

** MACA-65 POST-MAIZE GARDENING, FALL (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	328	0.385735	0.385735
BEAR	475	0.288300	0.288300
BEAR	431	0.304550	0.304550
BLUEBERRIES	81	0.308810	0.308810
BOX TURTLE	600	1.039474	1.039474
DEER	83	2.178650	2.178650
HICKORY	247	85.107450	85.107450
PAWPAW	12	0.432330	0.432330
RABBIT	184	0.633090	0.633090
RABBIT	304	0.490425	0.490425
RABBIT	284	0.490425	0.490425
SQUIRREL	542	0.494560	0.494560
SQUIRREL	1211	0.286500	0.286500
SQUIRREL	1015	0.390210	0.390210
TURKEY	146	0.521855	0.521855
TURKEY	283	0.418975	0.418975
TURKEY	305	0.315680	0.315680
** Total **		94.087019	94.087019

** MACA-65 POST-MAIZE GARDENING, SPRING (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	363	0.385735	0.385735
BEAR	440	0.288300	0.288300
BEAR	239	0.337030	0.337030
BOX TURTLE	600	1.039474	1.039474
DEER	118	2.178650	2.178650
DEER	160	2.002770	2.002770
HICKORY	277	85.107450	85.107450
MUSHROOM	110	3.224500	3.224500
POKE GREENS	44	1.105540	1.105540
RABBIT	219	0.633090	0.633090
RABBIT	269	0.490425	0.490425
RABBIT	289	0.633090	0.633090
SQUIRREL	577	0.494560	0.494560
SQUIRREL	1176	0.286500	0.286500
SQUIRREL	704	0.422945	0.422945
TURKEY	181	0.521855	0.521855
TURKEY	248	0.418975	0.418975
TURKEY	216	0.521855	0.521855
** Total **		100.092744	100.092744

** MACA-65 POST-MAIZE GARDENING, SUMMER (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	475	0.288300	0.288300
BEAR	416	0.304550	0.304550
BEAR	239	0.337030	0.337030
BLUEBERRIES	65	0.308810	0.308810
BOX TURTLE	600	1.039474	1.039474
DEER	160	2.002770	2.002770
RABBIT	304	0.490425	0.490425
RABBIT	269	0.490425	0.490425
RABBIT	289	0.633090	0.633090

SQUIRREL	1211	0.286500	0.286500
SQUIRREL	1000	0.390210	0.390210
SQUIRREL	704	0.422945	0.422945
TURKEY	283	0.418975	0.418975
TURKEY	290	0.315680	0.315680
TURKEY	216	0.521855	0.521855
** Total **		8.251039	8.251039

** MACA-65 POST-MAIZE GARDENING, WINTER (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	363	0.385735	0.385735
BEAR	431	0.304550	0.304550
BEAR	169	0.337030	0.337030
BLUEBERRIES	81	0.308810	0.308810
DEER	118	2.178650	2.178650
DEER	90	2.002770	2.002770
HICKORY	277	85.107450	85.107450
RABBIT	219	0.633090	0.633090
RABBIT	284	0.490425	0.490425
RABBIT	219	0.633090	0.633090
SQUIRREL	577	0.494560	0.494560
SQUIRREL	1015	0.390210	0.390210
SQUIRREL	634	0.422945	0.422945
TURKEY	181	0.521855	0.521855
TURKEY	305	0.315680	0.315680
TURKEY	146	0.521855	0.521855
** Total **		95.048705	95.048705

** MACA-89 FORAGING, FALL (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	328	0.385730	0.385730
BEAR	475	0.288295	0.288295
BEAR	431	0.304550	0.304550
BLUEBERRIES	81	0.189110	0.189110
BOX TURTLE	600	1.039473	1.039473
DEER	83	2.987410	2.987410
HICKORY	247	116.701070	116.701070
PAWPAW	12	0.264750	0.264750
RABBIT	184	0.633090	0.633090
RABBIT	304	0.490425	0.490425
RABBIT	284	0.490425	0.490425
SQUIRREL	542	0.494560	0.494560
SQUIRREL	1211	0.286500	0.286500
SQUIRREL	1015	0.390215	0.390215
TURKEY	146	0.715575	0.715575
TURKEY	283	0.574510	0.574510
TURKEY	305	0.432865	0.432865
** Total **		126.668553	126.668553

** MACA-89 FORAGING, SPRING (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	363	0.385730	0.385730
BEAR	440	0.288295	0.288295
BEAR	239	0.337030	0.337030
BOX TURTLE	600	1.039473	1.039473

DEER	118	2.987410	2.987410
DEER	160	2.746240	2.746240
HICKORY	277	116.701070	116.701070
MUSHROOM	110	4.421500	4.421500
POKE GREENS	44	0.677010	0.677010
RABBIT	219	0.633090	0.633090
RABBIT	269	0.490425	0.490425
RABBIT	289	0.633090	0.633090
SQUIRREL	577	0.494560	0.494560
SQUIRREL	1176	0.286500	0.286500
SQUIRREL	704	0.422945	0.422945
TURKEY	181	0.715575	0.715575
TURKEY	248	0.574510	0.574510
TURKEY	216	0.715575	0.715575
** Total **		134.550028	134.550028

** MACA-89 FORAGING, SUMMER (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	475	0.288295	0.288295
BEAR	416	0.304550	0.304550
BEAR	239	0.337030	0.337030
BLUEBERRIES	65	0.189110	0.189110
BOX TURTLE	600	1.039473	1.039473
DEER	160	2.746240	2.746240
RABBIT	304	0.490425	0.490425
RABBIT	269	0.490425	0.490425
RABBIT	289	0.633090	0.633090
SQUIRREL	1211	0.286500	0.286500
SQUIRREL	1000	0.390215	0.390215
SQUIRREL	704	0.422945	0.422945
TURKEY	283	0.574510	0.574510
TURKEY	290	0.432865	0.432865
TURKEY	216	0.715575	0.715575
** Total **		9.341248	9.341248

** MACA-89 FORAGING, WINTER (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	363	0.385730	0.385730
BEAR	431	0.304550	0.304550
BEAR	169	0.337030	0.337030
BLUEBERRIES	81	0.189110	0.189110
DEER	118	2.987410	2.987410
DEER	90	2.746240	2.746240
HICKORY	277	116.701070	116.701070
RABBIT	219	0.633090	0.633090
RABBIT	284	0.490425	0.490425
RABBIT	219	0.633090	0.633090
SQUIRREL	577	0.494560	0.494560
SQUIRREL	1015	0.390215	0.390215
SQUIRREL	634	0.422945	0.422945
TURKEY	181	0.715575	0.715575
TURKEY	305	0.432865	0.432865
TURKEY	146	0.715575	0.715575
** Total **		128.579480	128.579480

** MACA-89 PRE-MAIZE GARDENING, FALL (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	328	0.385730	0.385730
BEAR	475	0.288295	0.288295
BEAR	431	0.304550	0.304550
BLUEBERRIES	81	0.189110	0.189110
BOX TURTLE	600	1.039473	1.039473
DEER	83	2.987410	2.987410
HICKORY	247	116.701070	116.701070
PAWPAW	12	0.264750	0.264750
RABBIT	184	0.633090	0.633090
RABBIT	304	0.490425	0.490425
RABBIT	284	0.490425	0.490425
SQUIRREL	542	0.494560	0.494560
SQUIRREL	1211	0.286500	0.286500
SQUIRREL	1015	0.390215	0.390215
TURKEY	146	0.715575	0.715575
TURKEY	283	0.574510	0.574510
TURKEY	305	0.432865	0.432865
** Total **		126.668553	126.668553

** MACA-89 PRE-MAIZE GARDENING, SPRING (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	363	0.385730	0.385730
BEAR	440	0.288295	0.288295
BEAR	239	0.337030	0.337030
BOX TURTLE	600	1.039473	1.039473
DEER	118	2.987410	2.987410
DEER	160	2.746240	2.746240
HICKORY	277	116.701070	116.701070
MUSHROOM	110	4.421500	4.421500
POKE GREENS	44	0.677010	0.677010
RABBIT	219	0.633090	0.633090
RABBIT	269	0.490425	0.490425
RABBIT	289	0.633090	0.633090
SQUIRREL	577	0.494560	0.494560
SQUIRREL	1176	0.286500	0.286500
SQUIRREL	704	0.422945	0.422945
TURKEY	181	0.715575	0.715575
TURKEY	248	0.574510	0.574510
TURKEY	216	0.715575	0.715575
** Total **		134.550028	134.550028

** MACA-89 PRE-MAIZE GARDENING, SUMMER (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	475	0.288295	0.288295
BEAR	416	0.304550	0.304550
BEAR	239	0.337030	0.337030
BLUEBERRIES	65	0.189110	0.189110
BOX TURTLE	600	1.039473	1.039473
DEER	160	2.746240	2.746240
RABBIT	304	0.490425	0.490425
RABBIT	269	0.490425	0.490425
RABBIT	289	0.633090	0.633090
SQUIRREL	1211	0.286500	0.286500
SQUIRREL	1000	0.390215	0.390215
SQUIRREL	704	0.422945	0.422945

TURKEY	283	0.574510	0.574510
TURKEY	290	0.432865	0.432865
TURKEY	216	0.715575	0.715575
** Total **		9.341248	9.341248

** MACA-89 PRE-MAIZE GARDENING, WINTER (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	363	0.385730	0.385730
BEAR	431	0.304550	0.304550
BEAR	169	0.337030	0.337030
BLUEBERRIES	81	0.189110	0.189110
DEER	118	2.987410	2.987410
DEER	90	2.746240	2.746240
HICKORY	277	116.701070	116.701070
RABBIT	219	0.633090	0.633090
RABBIT	284	0.490425	0.490425
RABBIT	219	0.633090	0.633090
SQUIRREL	577	0.494560	0.494560
SQUIRREL	1015	0.390215	0.390215
SQUIRREL	634	0.422945	0.422945
TURKEY	181	0.715575	0.715575
TURKEY	305	0.432865	0.432865
TURKEY	146	0.715575	0.715575
** Total **		128.579480	128.579480

** MACA-89 POST-MAIZE GARDENING, FALL (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	328	0.385730	0.385730
BEAR	475	0.288295	0.288295
BEAR	431	0.304550	0.304550
BLUEBERRIES	81	0.189110	0.189110
BOX TURTLE	600	1.039473	1.039473
DEER	83	2.987410	2.987410
HICKORY	247	116.701070	116.701070
PAWPAW	12	0.264750	0.264750
RABBIT	184	0.633090	0.633090
RABBIT	304	0.490425	0.490425
RABBIT	284	0.490425	0.490425
SQUIRREL	542	0.494560	0.494560
SQUIRREL	1211	0.286500	0.286500
SQUIRREL	1015	0.390215	0.390215
TURKEY	146	0.715575	0.715575
TURKEY	283	0.574510	0.574510
TURKEY	305	0.432865	0.432865
** Total **		126.668553	126.668553

** MACA-89 POST-MAIZE GARDENING, SPRING (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	363	0.385730	0.385730
BEAR	440	0.288295	0.288295
BEAR	239	0.337030	0.337030
BOX TURTLE	600	1.039473	1.039473
DEER	118	2.987410	2.987410
DEER	160	2.746240	2.746240
HICKORY	277	116.701070	116.701070

MUSHROOM	110	4.421500	4.421500
POKE GREENS	44	0.677010	0.677010
RABBIT	219	0.633090	0.633090
RABBIT	269	0.490425	0.490425
RABBIT	289	0.633090	0.633090
SQUIRREL	577	0.494560	0.494560
SQUIRREL	1176	0.286500	0.286500
SQUIRREL	704	0.422945	0.422945
TURKEY	181	0.715575	0.715575
TURKEY	248	0.574510	0.574510
TURKEY	216	0.715575	0.715575
** Total **		134.550028	134.550028

** MACA-89 POST-MAIZE GARDENING, SUMMER (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	475	0.288295	0.288295
BEAR	416	0.304550	0.304550
BEAR	239	0.337030	0.337030
BLUEBERRIES	65	0.189110	0.189110
BOX TURTLE	600	1.039473	1.039473
DEER	160	2.746240	2.746240
RABBIT	304	0.490425	0.490425
RABBIT	269	0.490425	0.490425
RABBIT	289	0.633090	0.633090
SQUIRREL	1211	0.286500	0.286500
SQUIRREL	1000	0.390215	0.390215
SQUIRREL	704	0.422945	0.422945
TURKEY	283	0.574510	0.574510
TURKEY	290	0.432865	0.432865
TURKEY	216	0.715575	0.715575
** Total **		9.341248	9.341248

** MACA-89 POST-MAIZE GARDENING, WINTER (NO ACORNS OR SQUASH) **INFEASABLE**

BEAR	363	0.385730	0.385730
BEAR	431	0.304550	0.304550
BEAR	169	0.337030	0.337030
BLUEBERRIES	81	0.189110	0.189110
DEER	118	2.987410	2.987410
DEER	90	2.746240	2.746240
HICKORY	277	116.701070	116.701070
RABBIT	219	0.633090	0.633090
RABBIT	284	0.490425	0.490425
RABBIT	219	0.633090	0.633090
SQUIRREL	577	0.494560	0.494560
SQUIRREL	1015	0.390215	0.390215
SQUIRREL	634	0.422945	0.422945
TURKEY	181	0.715575	0.715575
TURKEY	305	0.432865	0.432865
TURKEY	146	0.715575	0.715575
** Total **		128.579480	128.579480

** MACA-93 FORAGING, FALL (NO ACORNS OR SQUASH)

BEAR	328	0.000000	0.385160

BEAR	475	0.000000	0.287870
BEAR	431	0.000000	0.304100
BEAVER	170	0.000000	0.000315
BEAVER	205	0.000000	0.000630
BERRIES (RUBUS)	81	0.000000	0.013180
BLACK CHERRY	74	0.000000	13.180000
BLUEBERRIES	**81**	**0.174061**	**0.240440**
BOX TURTLE	600	0.000000	1.037927
CHENOPODIUM SEEDS	153	0.000000	105.476900
DEER	**83**	**2.545190**	**2.545190**
DEER	132	0.000000	0.074230
DEER	111	0.000000	0.075215
DUCK	4178	0.000000	0.006580
FISH	**28**	**1.137680**	**1.137680**
FISH	89	0.000000	1.137680
FISH	**63**	**1.137680**	**1.137680**
GRAPE	46	0.000000	0.084660
HAWTHORN	**65**	**0.013180**	**0.013180**
HAZELNUT	1277	0.000000	0.044360
HICKORY	**247**	**0.436149**	**99.426200**
MUSKRAT	480	0.000000	0.017495
MUSKRAT	543	0.000000	0.034990
MUSSEL	**40**	**0.617515**	**4.333780**
OPOSSUM	184	0.000000	0.010175
OPOSSUM	304	0.000000	0.010175
OPOSSUM	284	0.000000	0.010175
PAWPAW	**12**	**0.336620**	**0.336620**
PLUM	**28**	**0.184520**	**0.184520**
RABBIT	184	0.000000	0.632145
RABBIT	304	0.000000	0.489700
RABBIT	284	0.000000	0.489700
RACCOON	242	0.000000	0.027385
RACCOON	430	0.000000	0.016430
RACCOON	398	0.000000	0.017225
SNAPPING TURTLE	179	0.000000	0.000665
SOFTSHELL TURTLE	274	0.000000	0.000590
SQUIRREL	542	0.000000	0.493825
SQUIRREL	1211	0.000000	0.286070
SQUIRREL	1015	0.000000	0.389630
TERRAPIN	165	0.000000	0.015670
TUBER	60	0.000000	0.515650
TUBER	85	0.000000	0.592055
TURKEY	146	0.000000	0.630980
TURKEY	283	0.000000	0.506590
TURKEY	305	0.000000	0.381695
WALNUT	887	0.000000	25.094720
** Total **		6.582595	262.127832

** MACA-93 FORAGING, SPRING (NO ACORNS OR SQUASH)

AMARANTH GREENS	**44**	**0.690820**	**0.690820**
BEAR	363	0.000000	0.385160
BEAR	440	0.000000	0.287870
BEAR	239	0.000000	0.336525
BEAVER	205	0.000000	0.000315
BEAVER	170	0.000000	0.000315
BEAVER	205	0.000000	0.000315
BOX TURTLE	600	0.000000	1.037927
CHENOPODIUM GREENS	**44**	**0.025597**	**0.143820**

CHENOPODIUM SEEDS	**163**	**2.790797**	**105.476900**
DEER	118	0.000000	2.545190
DEER	97	0.000000	0.074230
DEER	160	0.000000	2.339720
DUCK	4178	0.000000	0.006580
FISH	**63**	**1.137680**	**1.137680**
FISH	**56**	**1.137680**	**1.137680**
GREENS (OTHER)	100	0.000000	0.188740
HAWTHORN	81	0.000000	0.013180
HAZELNUT	1287	0.000000	0.044360
HICKORY	277	0.000000	99.426200
MUSHROOM	110	0.000000	3.767000
MUSKRAT	543	0.000000	0.017495
MUSKRAT	480	0.000000	0.017495
MUSKRAT	543	0.000000	0.017495
OPOSSUM	219	0.000000	0.010175
OPOSSUM	269	0.000000	0.010175
OPOSSUM	289	0.000000	0.010175
PLUM	46	0.000000	0.184520
POKE GREENS	44	0.000000	0.860780
RABBIT	219	0.000000	0.632145
RABBIT	269	0.000000	0.489700
RABBIT	289	0.000000	0.632145
RACCOON	277	0.000000	0.027385
RACCOON	395	0.000000	0.016430
RACCOON	430	0.000000	0.021905
SNAPPING TURTLE	179	0.000000	0.000665
SOFTSHELL TURTLE	274	0.000000	0.000590
SQUIRREL	577	0.000000	0.493825
SQUIRREL	1176	0.000000	0.286070
SQUIRREL	704	0.000000	0.422315
TERRAPIN	165	0.000000	0.015670
TUBER	85	0.000000	0.515650
TUBER	60	0.000000	0.496555
TUBER	85	0.000000	0.324690
TURKEY	181	0.000000	0.630980
TURKEY	248	0.000000	0.506590
TURKEY	216	0.000000	0.630980
WALNUT	897	0.000000	25.094720
** Total **		5.782574	251.407847

** MACA-93 FORAGING, SUMMER (NO ACORNS OR SQUASH)

AMARANTH GREENS	44	0.000000	0.690820
BEAR	475	0.000000	0.287870
BEAR	416	0.000000	0.304100
BEAR	239	0.000000	0.336525
BEAVER	205	0.000000	0.000315
BEAVER	170	0.000000	0.000315
BEAVER	205	0.000000	0.000315
BERRIES (RUBUS)	65	0.000000	0.013180
BLACK CHERRY	60	0.000000	13.180000
BLUEBERRIES	**65**	**0.240440**	**0.240440**
BOX TURTLE	600	0.000000	1.037927
CHENOPODIUM GREENS	**44**	**0.006356**	**0.143820**
DEER	132	0.000000	0.074230
DEER	**96**	**0.075215**	**0.075215**
DEER	**160**	**2.323955**	**2.339720**
DUCK	4178	0.000000	0.006580

FISH	**89**	**1.137680**	**1.137680**
FISH	**28**	**1.137680**	**1.137680**
GRAPE	28	0.000000	0.084660
GREENS (OTHER)	100	0.000000	0.094370
MUSKRAT	543	0.000000	0.017495
MUSKRAT	480	0.000000	0.017495
MUSKRAT	543	0.000000	0.017495
MUSSEL	**40**	**4.333780**	**4.333780**
OPOSSUM	304	0.000000	0.010175
OPOSSUM	269	0.000000	0.010175
OPOSSUM	289	0.000000	0.010175
RABBIT	304	0.000000	0.489700
RABBIT	269	0.000000	0.489700
RABBIT	289	0.000000	0.632145
RACCOON	430	0.000000	0.016430
RACCOON	378	0.000000	0.017225
RACCOON	430	0.000000	0.021905
SNAPPING TURTLE	179	0.000000	0.000665
SOFTSHELL TURTLE	274	0.000000	0.000590
SQUIRREL	1211	0.000000	0.286070
SQUIRREL	1000	0.000000	0.389630
SQUIRREL	704	0.000000	0.422315
TERRAPIN	165	0.000000	0.015670
TUBER	85	0.000000	0.496555
TUBER	60	0.000000	0.095500
TUBER	85	0.000000	0.324690
TURKEY	283	0.000000	0.506590
TURKEY	290	0.000000	0.381695
TURKEY	216	0.630980	0.630980
** Total **		9.886086	30.820607

** MACA-93 FORAGING, WINTER (NO ACORNS OR SQUASH)

BEAR	363	0.000000	0.385160
BEAR	431	0.000000	0.304100
BEAR	169	0.000000	0.336525
BEAVER	205	0.000000	0.000630
BEAVER	170	0.000000	0.000315
BERRIES (RUBUS)	**81**	**0.013180**	**0.013180**
BLACK CHERRY	**74**	**1.141085**	**13.180000**
BLUEBERRIES	**81**	**0.240440**	**0.240440**
CHENOPODIUM SEEDS	**163**	**3.912243**	**105.476900**
DEER	118	0.000000	2.545190
DEER	111	0.000000	0.075215
DEER	**90**	**0.738064**	**2.339720**
DUCK	4178	0.000000	0.006580
FISH	63	0.000000	2.275360
GRAPE	46	0.000000	0.084660
HAWTHORN	**81**	**0.013180**	**0.013180**
HAZELNUT	1287	0.000000	0.044360
HICKORY	277	0.000000	99.426200
MUSKRAT	543	0.000000	0.034990
MUSKRAT	480	0.000000	0.017495
OPOSSUM	219	0.000000	0.010175
OPOSSUM	284	0.000000	0.010175
OPOSSUM	219	0.000000	0.010175
PLUM	**46**	**0.184520**	**0.184520**
RABBIT	219	0.000000	0.632145
RABBIT	284	0.000000	0.489700

RABBIT	219	0.000000	0.632145
RACCOON	277	0.000000	0.027385
RACCOON	398	0.000000	0.017225
RACCOON	395	0.000000	0.021905
SNAPPING TURTLE	179	0.000000	0.000665
SQUIRREL	577	0.000000	0.493825
SQUIRREL	1015	0.000000	0.389630
SQUIRREL	634	0.000000	0.422315
TUBER	85	0.000000	0.611150
TUBER	60	0.000000	0.324690
TURKEY	181	0.000000	0.630980
TURKEY	305	0.000000	0.381695
TURKEY	146	0.000000	0.630980
WALNUT	897	0.000000	25.094720
** Total **		6.242712	257.816400

** MACA-93 PRE-MAIZE GARDENING, FALL (NO ACORNS OR SQUASH)

BEAR	328	0.000000	0.385160
BEAR	475	0.000000	0.287870
BEAR	431	0.000000	0.304100
BEAVER	170	0.000000	0.000315
BEAVER	205	0.000000	0.000630
BERRIES (RUBUS)	81	0.000000	0.013180
BLACK CHERRY	74	0.000000	13.180000
BLUEBERRIES	**81**	**0.174061**	**0.240440**
BOX TURTLE	600	0.000000	1.037927
CHENOPODIUM SEEDS	153	0.000000	105.476900
DEER	**83**	**2.545190**	**2.545190**
DEER	132	0.000000	0.074230
DEER	111	0.000000	0.075215
DUCK	4178	0.000000	0.006580
FISH	**28**	**1.137680**	**1.137680**
FISH	89	0.000000	1.137680
FISH	**63**	**1.137680**	**1.137680**
GRAPE	46	0.000000	0.084660
HAWTHORN	**65**	**0.013180**	**0.013180**
HAZELNUT	1277	0.000000	0.044360
HICKORY	**247**	**0.436149**	**99.426200**
MUSKRAT	480	0.000000	0.017495
MUSKRAT	543	0.000000	0.034990
MUSSEL	**40**	**0.617515**	**4.333780**
OPOSSUM	184	0.000000	0.010175
OPOSSUM	304	0.000000	0.010175
OPOSSUM	284	0.000000	0.010175
PAWPAW	**12**	**0.336620**	**0.336620**
PLUM	**28**	**0.184520**	**0.184520**
RABBIT	184	0.000000	0.632145
RABBIT	304	0.000000	0.489700
RABBIT	284	0.000000	0.489700
RACCOON	242	0.000000	0.027385
RACCOON	430	0.000000	0.016430
RACCOON	398	0.000000	0.017225
SNAPPING TURTLE	179	0.000000	0.000665
SOFTSHELL TURTLE	274	0.000000	0.000590
SQUIRREL	542	0.000000	0.493825
SQUIRREL	1211	0.000000	0.286070
SQUIRREL	1015	0.000000	0.389630
SUNFLOWER	410	0.000000	83.034000

TERRAPIN	165	0.000000	0.015670
TUBER	60	0.000000	0.515650
TUBER	85	0.000000	0.592055
TURKEY	146	0.000000	0.630980
TURKEY	283	0.000000	0.506590
TURKEY	305	0.000000	0.381695
WALNUT	887	0.000000	25.094720
** Total **		6.582595	345.161832

** MACA-93 PRE-MAIZE GARDENING, SPRING (NO ACORNS OR SQUASH)

AMARANTH GREENS	44	0.000000	0.690820
BEAR	363	0.000000	0.385160
BEAR	440	0.000000	0.287870
BEAR	239	0.000000	0.336525
BEAVER	205	0.000000	0.000315
BEAVER	170	0.000000	0.000315
BEAVER	205	0.000000	0.000315
BOX TURTLE	600	0.000000	1.037927
CHENOPODIUM GREENS	44	0.000000	0.143820
CHENOPODIUM SEEDS	**163**	**2.790797**	**105.476900**
DEER	118	0.000000	2.545190
DEER	97	0.000000	0.074230
DEER	160	0.000000	2.339720
DUCK	4178	0.000000	0.006580
FISH	**63**	**1.137680**	**1.137680**
FISH	**56**	**1.137680**	**1.137680**
GREENS (OTHER)	100	0.000000	0.188740
HAWTHORN	81	0.000000	0.013180
HAZELNUT	1287	0.000000	0.044360
HICKORY	277	0.000000	99.426200
MUSHROOM	110	0.000000	3.767000
MUSKRAT	543	0.000000	0.017495
MUSKRAT	480	0.000000	0.017495
MUSKRAT	543	0.000000	0.017495
OPOSSUM	219	0.000000	0.010175
OPOSSUM	269	0.000000	0.010175
OPOSSUM	289	0.000000	0.010175
PLUM	46	0.000000	0.184520
POKE GREENS	**44**	**0.716417**	**0.860780**
RABBIT	219	0.000000	0.632145
RABBIT	269	0.000000	0.489700
RABBIT	289	0.000000	0.632145
RACCOON	277	0.000000	0.027385
RACCOON	395	0.000000	0.016430
RACCOON	430	0.000000	0.021905
SNAPPING TURTLE	179	0.000000	0.000665
SOFTSHELL TURTLE	274	0.000000	0.000590
SQUIRREL	577	0.000000	0.493825
SQUIRREL	1176	0.000000	0.286070
SQUIRREL	704	0.000000	0.422315
SUNFLOWER	418	0.000000	83.034000
TERRAPIN	165	0.000000	0.015670
TUBER	85	0.000000	0.515650
TUBER	60	0.000000	0.496555
TUBER	85	0.000000	0.324690
TURKEY	181	0.000000	0.630980
TURKEY	248	0.000000	0.506590
TURKEY	216	0.000000	0.630980

WALNUT	897	0.000000	25.094720
** Total **		5.782574	334.441847

** MACA-93 PRE-MAIZE GARDENING, SUMMER (NO ACORNS OR SQUASH)

AMARANTH GREENS	44	0.000000	0.690820
BEAR	475	0.000000	0.287870
BEAR	416	0.000000	0.304100
BEAR	239	0.000000	0.336525
BEAVER	205	0.000000	0.000315
BEAVER	170	0.000000	0.000315
BEAVER	205	0.000000	0.000315
BERRIES (RUBUS)	65	0.000000	0.013180
BLACK CHERRY	60	0.000000	13.180000
BLUEBERRIES	**65**	**0.240440**	**0.240440**
BOX TURTLE	600	0.000000	1.037927
CHENOPODIUM GREENS	**44**	**0.006356**	**0.143820**
DEER	132	0.000000	0.074230
DEER	**96**	**0.075215**	**0.075215**
DEER	**160**	**2.323955**	**2.339720**
DUCK	4178	0.000000	0.006580
FISH	**89**	**1.137680**	**1.137680**
FISH	**28**	**1.137680**	**1.137680**
GRAPE	**28**	**0.084660**	**0.084660**
GREENS (OTHER)	100	0.000000	0.094370
MUSKRAT	543	0.000000	0.017495
MUSKRAT	480	0.000000	0.017495
MUSKRAT	543	0.000000	0.017495
MUSSEL	**40**	**4.333780**	**4.333780**
OPOSSUM	304	0.000000	0.010175
OPOSSUM	269	0.000000	0.010175
OPOSSUM	289	0.000000	0.010175
RABBIT	304	0.000000	0.489700
RABBIT	269	0.000000	0.489700
RABBIT	289	0.000000	0.632145
RACCOON	430	0.000000	0.016430
RACCOON	378	0.000000	0.017225
RACCOON	430	0.000000	0.021905
SNAPPING TURTLE	179	0.000000	0.000665
SOFTSHELL TURTLE	274	0.000000	0.000590
SQUIRREL	1211	0.000000	0.286070
SQUIRREL	1000	0.000000	0.389630
SQUIRREL	704	0.000000	0.422315
TERRAPIN	165	0.000000	0.015670
TUBER	85	0.000000	0.496555
TUBER	60	0.000000	0.095500
TUBER	85	0.000000	0.324690
TURKEY	283	0.000000	0.506590
TURKEY	290	0.000000	0.381695
TURKEY	216	0.630980	0.630980
** Total **		9.970746	30.820607

** MACA-93 PRE-MAIZE GARDENING, WINTER (NO ACORNS OR SQUASH)

BEAR	363	0.000000	0.385160
BEAR	431	0.000000	0.304100
BEAR	169	0.000000	0.336525

BEAVER	205	0.000000	0.000630
BEAVER	170	0.000000	0.000315
BERRIES (RUBUS)	**81**	**0.013180**	**0.013180**
BLACK CHERRY	**74**	**1.141085**	**13.180000**
BLUEBERRIES	**81**	**0.240442**	**0.240440**
CHENOPODIUM SEEDS	**163**	**3.912243**	**105.476900**
DEER	118	0.000000	2.545190
DEER	111	0.000000	0.075215
DEER	**90**	**0.738064**	**2.339720**
DUCK	4178	0.000000	0.006580
FISH	63	0.000000	2.275360
GRAPE	46	0.000000	0.084660
HAWTHORN	**81**	**0.013180**	**0.013180**
HAZELNUT	1287	0.000000	0.044360
HICKORY	277	0.000000	99.426200
MUSKRAT	543	0.000000	0.034990
MUSKRAT	480	0.000000	0.017495
OPOSSUM	219	0.000000	0.010175
OPOSSUM	284	0.000000	0.010175
OPOSSUM	219	0.000000	0.010175
PLUM	**46**	**0.184520**	**0.184520**
RABBIT	219	0.000000	0.632145
RABBIT	284	0.000000	0.489700
RABBIT	219	0.000000	0.632145
RACCOON	277	0.000000	0.027385
RACCOON	398	0.000000	0.017225
RACCOON	395	0.000000	0.021905
SNAPPING TURTLE	179	0.000000	0.000665
SQUIRREL	577	0.000000	0.493825
SQUIRREL	1015	0.000000	0.389630
SQUIRREL	634	0.000000	0.422315
SUNFLOWER	418	0.000000	83.034000
TUBER	85	0.000000	0.611150
TUBER	60	0.000000	0.324690
TURKEY	181	0.000000	0.630980
TURKEY	305	0.000000	0.381695
TURKEY	146	0.000000	0.630980
WALNUT	897	0.000000	25.094720
** Total **		6.242714	340.850400

** MACA-93 POST-MAIZE GARDENING, FALL (NO ACORNS OR SQUASH)

BEAR	328	0.000000	0.385160
BEAR	475	0.000000	0.287870
BEAR	431	0.000000	0.304100
BEAVER	170	0.000000	0.000315
BEAVER	205	0.000000	0.000630
BERRIES (RUBUS)	**81**	**0.013180**	**0.013180**
BLACK CHERRY	74	0.000000	13.180000
BLUEBERRIES	**81**	**0.240440**	**0.240440**
BOX TURTLE	600	0.000000	1.037927
CHENOPODIUM SEEDS	153	0.000000	105.476900
DEER	**83**	**1.547398**	**2.545190**
DEER	132	0.000000	0.074230
DEER	111	0.000000	0.075215
DUCK	4178	0.000000	0.006580
FISH	**28**	**1.137680**	**1.137680**
FISH	89	0.000000	1.137680
FISH	63	0.000000	1.137680

GRAPE	46	0.000000	0.084660
HAWTHORN	**65**	**0.013180**	**0.013180**
HAZELNUT	1277	0.000000	0.044360
HICKORY	247	0.000000	99.426200
MAIZE	**71**	**1.941932**	**207.047255**
MAIZE	**84**	**0.269647**	**207.047255**
MUSKRAT	480	0.000000	0.017495
MUSKRAT	543	0.000000	0.034990
MUSSEL	**40**	**0.606154**	**4.333780**
OPOSSUM	184	0.000000	0.010175
OPOSSUM	304	0.000000	0.010175
OPOSSUM	284	0.000000	0.010175
PAWPAW	**12**	**0.336620**	**0.336620**
PLUM	**28**	**0.184520**	**0.184520**
RABBIT	184	0.000000	0.632145
RABBIT	304	0.000000	0.489700
RABBIT	284	0.000000	0.489700
RACCOON	242	0.000000	0.027385
RACCOON	430	0.000000	0.016430
RACCOON	398	0.000000	0.017225
SNAPPING TURTLE	179	0.000000	0.000665
SOFTSHELL TURTLE	274	0.000000	0.000590
SQUIRREL	542	0.000000	0.493825
SQUIRREL	1211	0.000000	0.286070
SQUIRREL	1015	0.000000	0.389630
SUNFLOWER	410	0.000000	83.034000
TERRAPIN	165	0.000000	0.015670
TUBER	60	0.000000	0.515650
TUBER	85	0.000000	0.592055
TURKEY	146	0.000000	0.630980
TURKEY	283	0.000000	0.506590
TURKEY	305	0.000000	0.381695
WALNUT	887	0.000000	25.094720
** Total **		6.290751	759.256342

** MACA-93 POST-MAIZE GARDENING, SPRING (NO ACORNS OR SQUASH)

AMARANTH GREENS	**44**	**0.690820**	**0.690820**
BEAR	363	0.000000	0.385160
BEAR	440	0.000000	0.287870
BEAR	239	0.000000	0.336525
BEAVER	205	0.000000	0.000315
BEAVER	170	0.000000	0.000315
BEAVER	205	0.000000	0.000315
BOX TURTLE	600	0.000000	1.037927
CHENOPODIUM GREENS	**44**	**0.143820**	**0.143820**
CHENOPODIUM SEEDS	**163**	**1.126641**	**105.476900**
DEER	118	0.000000	2.545190
DEER	97	0.000000	0.074230
DEER	160	0.000000	2.339720
DUCK	4178	0.000000	0.006580
FISH	63	0.000000	1.137680
FISH	56	0.000000	1.137680
GREENS (OTHER)	100	0.000000	0.188740
HAWTHORN	81	0.000000	0.013180
HAZELNUT	1287	0.000000	0.044360
HICKORY	277	0.000000	99.426200
MAIZE	**84**	**2.596981**	**207.047255**
MUSHROOM	110	0.000000	3.767000

MUSKRAT	543	0.000000	0.017495
MUSKRAT	480	0.000000	0.017495
MUSKRAT	543	0.000000	0.017495
OPOSSUM	219	0.000000	0.010175
OPOSSUM	269	0.000000	0.010175
OPOSSUM	289	0.000000	0.010175
PLUM	46	0.000000	0.184520
POKE GREENS	**44**	**0.860780**	**0.860780**
RABBIT	219	0.000000	0.632145
RABBIT	269	0.000000	0.489700
RABBIT	289	0.000000	0.632145
RACCOON	277	0.000000	0.027385
RACCOON	395	0.000000	0.016430
RACCOON	430	0.000000	0.021905
SNAPPING TURTLE	179	0.000000	0.000665
SOFTSHELL TURTLE	274	0.000000	0.000590
SQUIRREL	577	0.000000	0.493825
SQUIRREL	1176	0.000000	0.286070
SQUIRREL	704	0.000000	0.422315
SUNFLOWER	418	0.000000	83.034000
TERRAPIN	165	0.000000	0.015670
TUBER	85	0.000000	0.515650
TUBER	60	0.000000	0.496555
TUBER	85	0.000000	0.324690
TURKEY	181	0.000000	0.630980
TURKEY	248	0.000000	0.506590
TURKEY	216	0.000000	0.630980
WALNUT	897	0.000000	25.094720
** Total **		5.419042	541.489102

** MACA-93 POST-MAIZE GARDENING, SUMMER (NO ACORNS OR SQUASH)

AMARANTH GREENS	44	0.000000	0.690820
BEAR	475	0.000000	0.287870
BEAR	416	0.000000	0.304100
BEAR	239	0.000000	0.336525
BEAVER	205	0.000000	0.000315
BEAVER	170	0.000000	0.000315
BEAVER	205	0.000000	0.000315
BERRIES (RUBUS)	65	0.000000	0.013180
BLACK CHERRY	60	0.000000	13.180000
BLUEBERRIES	65	0.000000	0.240440
BOX TURTLE	600	0.000000	1.037927
CHENOPODIUM GREENS	44	0.000000	0.143820
DEER	132	0.000000	0.074230
DEER	96	0.000000	0.075215
DEER	160	0.000000	2.339720
DUCK	4178	0.000000	0.006580
FISH	**89**	**1.137680**	**1.137680**
FISH	**28**	**1.137680**	**1.137680**
GRAPE	**28**	**0.084660**	**0.084660**
GREENS (OTHER)	100	0.000000	0.094370
MAIZE	**71**	**4.621284**	**207.047255**
MUSKRAT	543	0.000000	0.017495
MUSKRAT	480	0.000000	0.017495
MUSKRAT	543	0.000000	0.017495
MUSSEL	**40**	**4.333780**	**4.333780**
OPOSSUM	304	0.000000	0.010175
OPOSSUM	269	0.000000	0.010175

OPOSSUM	289	0.000000	0.010175
RABBIT	304	0.000000	0.489700
RABBIT	269	0.000000	0.489700
RABBIT	289	0.000000	0.632145
RACCOON	430	0.000000	0.016430
RACCOON	378	0.000000	0.017225
RACCOON	430	0.000000	0.021905
SNAPPING TURTLE	179	0.000000	0.000665
SOFTSHELL TURTLE	274	0.000000	0.000590
SQUIRREL	1211	0.000000	0.286070
SQUIRREL	1000	0.000000	0.389630
SQUIRREL	704	0.000000	0.422315
TERRAPIN	165	0.000000	0.015670
TUBER	85	0.000000	0.496555
TUBER	60	0.000000	0.095500
TUBER	85	0.000000	0.324690
TURKEY	283	0.000000	0.506590
TURKEY	290	0.000000	0.381695
TURKEY	216	0.630980	0.630980
** Total **		11.946064	237.867862

** MACA-93 POST-MAIZE GARDENING, WINTER (NO ACORNS OR SQUASH)

BEAR	363	0.000000	0.385160
BEAR	431	0.000000	0.304100
BEAR	169	0.000000	0.336525
BEAVER	205	0.000000	0.000630
BEAVER	170	0.000000	0.000315
BERRIES (RUBUS)	**81**	**0.013180**	**0.013180**
BLACK CHERRY	**74**	**1.141085**	**13.180000**
BLUEBERRIES	**81**	**0.240440**	**0.240440**
CHENOPODIUM SEEDS	**163**	**3.912243**	**105.476900**
DEER	118	0.000000	2.545190
DEER	111	0.000000	0.075215
DEER	**90**	**0.738064**	**2.339720**
DUCK	4178	0.000000	0.006580
FISH	63	0.000000	2.275360
GRAPE	46	0.000000	0.084660
HAWTHORN	**81**	**0.013180**	**0.013180**
HAZELNUT	1287	0.000000	0.044360
HICKORY	277	0.000000	99.426200
MAIZE	84	0.000000	414.094510
MUSKRAT	543	0.000000	0.034990
MUSKRAT	480	0.000000	0.017495
OPOSSUM	219	0.000000	0.010175
OPOSSUM	284	0.000000	0.010175
OPOSSUM	219	0.000000	0.010175
PLUM	**46**	**0.184520**	**0.184520**
RABBIT	219	0.000000	0.632145
RABBIT	284	0.000000	0.489700
RABBIT	219	0.000000	0.632145
RACCOON	277	0.000000	0.027385
RACCOON	398	0.000000	0.017225
RACCOON	395	0.000000	0.021905
SNAPPING TURTLE	179	0.000000	0.000665
SQUIRREL	577	0.000000	0.493825
SQUIRREL	1015	0.000000	0.389630
SQUIRREL	634	0.000000	0.422315
SUNFLOWER	418	0.000000	83.034000

TUBER	85	0.000000	0.611150
TUBER	60	0.000000	0.324690
TURKEY	181	0.000000	0.630980
TURKEY	305	0.000000	0.381695
TURKEY	146	0.000000	0.630980
WALNUT	897	0.000000	25.094720
** Total **		6.242712	754.944910

** MACA-137 FORAGING, FALL (NO ACORNS OR SQUASH)

BEAR	328	0.000000	0.370220
BEAR	475	0.000000	0.276710
BEAR	431	0.000000	0.292310
BEAVER	170	0.000000	0.008570
BEAVER	205	0.000000	0.017140
BERRIES (RUBUS)	81	0.000000	0.072200
BLACK CHERRY	74	0.000000	72.198500
BLUEBERRIES	81	0.000000	0.272150
BOX TURTLE	600	0.000000	0.997694
CHENOPODIUM SEEDS	153	0.000000	577.790160
DEER	**83**	**1.767090**	**1.767090**
DEER	132	0.000000	0.406635
DEER	111	0.000000	0.412020
DUCK	4178	0.000000	0.177620
FISH	**28**	**5.398231**	**30.710150**
FISH	89	0.000000	30.710150
FISH	63	0.000000	30.710150
GRAPE	46	0.000000	0.463730
HAWTHORN	65	0.000000	0.072200
HAZELNUT	1277	0.000000	0.243020
HICKORY	247	0.000000	69.030210
MUSKRAT	480	0.000000	0.472240
MUSKRAT	543	0.000000	0.944480
MUSSEL	**40**	**0.565094**	**116.984290**
OPOSSUM	184	0.000000	0.055730
OPOSSUM	304	0.000000	0.055730
OPOSSUM	284	0.000000	0.055730
PAWPAW	**12**	**0.381010**	**0.381010**
PLUM	**28**	**0.573408**	**1.010780**
RABBIT	184	0.000000	0.607645
RABBIT	304	0.000000	0.470715
RABBIT	284	0.000000	0.470715
RACCOON	242	0.000000	0.150005
RACCOON	430	0.000000	0.090005
RACCOON	398	0.000000	0.094365
SNAPPING TURTLE	179	0.000000	0.017960
SOFTSHELL TURTLE	274	0.000000	0.015925
SQUIRREL	542	0.000000	0.474680
SQUIRREL	1211	0.000000	0.274980
SQUIRREL	1015	0.000000	0.374530
TERRAPIN	165	0.000000	0.423050
TUBER	60	0.000000	2.824660
TUBER	85	0.000000	3.243230
TURKEY	146	0.000000	0.540115
TURKEY	283	0.000000	0.433640
TURKEY	305	0.000000	0.326725
WALNUT	887	0.000000	137.465940
** Total **		8.684833	1085.257504

** MACA-137 FORAGING, SPRING (NO ACORNS OR SQUASH)

AMARANTH GREENS	**44**	**1.966522**	**3.784210**
BEAR	363	0.000000	0.370220
BEAR	440	0.000000	0.276710
BEAR	239	0.000000	0.323480
BEAVER	205	0.000000	0.008570
BEAVER	170	0.000000	0.008570
BEAVER	205	0.000000	0.008570
BOX TURTLE	600	0.000000	0.997694
CHENOPODIUM GREENS	44	0.000000	0.787830
CHENOPODIUM SEEDS	163	0.000000	577.790160
DEER	118	0.000000	1.767090
DEER	97	0.000000	0.406635
DEER	160	0.000000	1.624435
DUCK	4178	0.000000	0.177620
FISH	63	0.000000	30.710150
FISH	**56**	**8.588686**	**30.710150**
GREENS (OTHER)	100	0.000000	1.033880
HAWTHORN	81	0.000000	0.072200
HAZELNUT	1287	0.000000	0.243020
HICKORY	277	0.000000	69.030210
MUSHROOM	110	0.000000	2.615380
MUSKRAT	543	0.000000	0.472240
MUSKRAT	480	0.000000	0.472240
MUSKRAT	543	0.000000	0.472240
OPOSSUM	219	0.000000	0.055730
OPOSSUM	269	0.000000	0.055730
OPOSSUM	289	0.000000	0.055730
PLUM	46	0.000000	1.010780
POKE GREENS	44	0.000000	0.974300
RABBIT	219	0.000000	0.607645
RABBIT	269	0.000000	0.470715
RABBIT	289	0.000000	0.607645
RACCOON	277	0.000000	0.150005
RACCOON	395	0.000000	0.090005
RACCOON	430	0.000000	0.120000
SNAPPING TURTLE	179	0.000000	0.017960
SOFTSHELL TURTLE	274	0.000000	0.015925
SQUIRREL	577	0.000000	0.474680
SQUIRREL	1176	0.000000	0.274980
SQUIRREL	704	0.000000	0.405945
TERRAPIN	165	0.000000	0.423050
TUBER	85	0.000000	2.824660
TUBER	60	0.000000	2.720080
TUBER	85	0.000000	1.778610
TURKEY	181	0.000000	0.540115
TURKEY	248	0.000000	0.433640
TURKEY	216	0.000000	0.540115
WALNUT	897	0.000000	137.465940
** Total **		10.555208	876.277489

** MACA-137 FORAGING, SUMMER (NO ACORNS OR SQUASH)

AMARANTH GREENS	**44**	**0.330834**	**3.784210**
BEAR	475	0.000000	0.276710
BEAR	416	0.000000	0.292310
BEAR	239	0.000000	0.323480

BEAVER	205	0.000000	0.008570
BEAVER	170	0.000000	0.008570
BEAVER	205	0.000000	0.008570
BERRIES (RUBUS)	65	0.000000	0.072200
BLACK CHERRY	60	0.000000	72.198500
BLUEBERRIES	65	0.000000	0.272150
BOX TURTLE	600	0.000000	0.997694
CHENOPODIUM GREENS	44	0.000000	0.787830
DEER	132	0.000000	0.406635
DEER	96	0.000000	0.412020
DEER	160	0.000000	1.624435
DUCK	4178	0.000000	0.177620
FISH	89	0.000000	30.710150
FISH	**28**	**8.519566**	**30.710150**
GRAPE	28	0.000000	0.463730
GREENS (OTHER)	100	0.000000	0.516940
MUSKRAT	543	0.000000	0.472240
MUSKRAT	480	0.000000	0.472240
MUSKRAT	543	0.000000	0.472240
MUSSEL	**40**	**0.399062**	**116.984290**
OPOSSUM	304	0.000000	0.055730
OPOSSUM	269	0.000000	0.055730
OPOSSUM	289	0.000000	0.055730
RABBIT	304	0.000000	0.470715
RABBIT	269	0.000000	0.470715
RABBIT	289	0.000000	0.607645
RACCOON	430	0.000000	0.090005
RACCOON	378	0.000000	0.094365
RACCOON	430	0.000000	0.120000
SNAPPING TURTLE	179	0.000000	0.017960
SOFTSHELL TURTLE	274	0.000000	0.015925
SQUIRREL	1211	0.000000	0.274980
SQUIRREL	1000	0.000000	0.374530
SQUIRREL	704	0.000000	0.405945
TERRAPIN	165	0.000000	0.423050
TUBER	85	0.000000	2.720080
TUBER	**60**	**0.523150**	**0.523150**
TUBER	85	0.000000	1.778610
TURKEY	283	0.000000	0.433640
TURKEY	290	0.000000	0.326725
TURKEY	216	0.000000	0.540115
** Total **		9.772612	272.308829

** MACA-137 FORAGING, WINTER (NO ACORNS OR SQUASH)

BEAR	363	0.000000	0.370220
BEAR	431	0.000000	0.292310
BEAR	169	0.000000	0.323480
BEAVER	205	0.000000	0.017140
BEAVER	170	0.000000	0.008570
BERRIES (RUBUS)	**81**	**0.072200**	**0.072200**
BLACK CHERRY	**74**	**0.527121**	**72.198500**
BLUEBERRIES	**81**	**0.272150**	**0.272150**
CHENOPODIUM SEEDS	**163**	**3.898944**	**577.790160**
DEER	118	0.000000	1.767090
DEER	111	0.000000	0.412020
DEER	**90**	**0.478028**	**1.624435**
DUCK	4178	0.000000	0.177620
FISH	63	0.000000	61.420300

GRAPE	46	0.000000	0.463730
HAWTHORN	**81**	**0.072200**	**0.072200**
HAZELNUT	1287	0.000000	0.243020
HICKORY	277	0.000000	69.030210
MUSKRAT	543	0.000000	0.944480
MUSKRAT	480	0.000000	0.472240
OPOSSUM	219	0.000000	0.055730
OPOSSUM	284	0.000000	0.055730
OPOSSUM	219	0.000000	0.055730
PLUM	**46**	**1.010780**	**1.010780**
RABBIT	219	0.000000	0.607645
RABBIT	284	0.000000	0.470715
RABBIT	219	0.000000	0.607645
RACCOON	277	0.000000	0.150005
RACCOON	398	0.000000	0.094365
RACCOON	395	0.000000	0.120000
SNAPPING TURTLE	179	0.000000	0.017960
SQUIRREL	577	0.000000	0.474680
SQUIRREL	1015	0.000000	0.374530
SQUIRREL	634	0.000000	0.405945
TUBER	85	0.000000	3.347810
TUBER	60	0.000000	1.778610
TURKEY	181	0.000000	0.540115
TURKEY	305	0.000000	0.326725
TURKEY	146	0.000000	0.540115
WALNUT	897	0.000000	137.465940
** Total **		6.331423	936.472850

** MACA-137 PRE-MAIZE GARDENING, FALL (NO ACORNS OR SQUASH)

BEAR	328	0.000000	0.370220
BEAR	475	0.000000	0.276710
BEAR	431	0.000000	0.292310
BEAVER	170	0.000000	0.008570
BEAVER	205	0.000000	0.017140
BERRIES (RUBUS)	81	0.000000	0.072200
BLACK CHERRY	74	0.000000	72.198500
BLUEBERRIES	81	0.000000	0.272150
BOX TURTLE	600	0.000000	0.997694
CHENOPODIUM SEEDS	153	0.000000	577.790160
DEER	**83**	**1.767090**	**1.767090**
DEER	132	0.000000	0.406635
DEER	111	0.000000	0.412020
DUCK	4178	0.000000	0.177620
FISH	**28**	**5.398331**	**30.710150**
FISH	89	0.000000	30.710150
FISH	63	0.000000	30.710150
GRAPE	46	0.000000	0.463730
HAWTHORN	65	0.000000	0.072200
HAZELNUT	1277	0.000000	0.243020
HICKORY	247	0.000000	69.030210
MUSKRAT	480	0.000000	0.472240
MUSKRAT	543	0.000000	0.944480
MUSSEL	**40**	**0.565094**	**116.984290**
OPOSSUM	184	0.000000	0.055730
OPOSSUM	304	0.000000	0.055730
OPOSSUM	284	0.000000	0.055730
PAWPAW	**12**	**0.381010**	**0.381010**
PLUM	**28**	**0.573408**	**1.010780**

RABBIT	184	0.000000	0.607645
RABBIT	304	0.000000	0.470715
RABBIT	284	0.000000	0.470715
RACCOON	242	0.000000	0.150005
RACCOON	430	0.000000	0.090005
RACCOON	398	0.000000	0.094365
SNAPPING TURTLE	179	0.000000	0.017960
SOFTSHELL TURTLE	274	0.000000	0.015925
SQUIRREL	542	0.000000	0.474680
SQUIRREL	1211	0.000000	0.274980
SQUIRREL	1015	0.000000	0.374530
SUNFLOWER	410	0.000000	454.850550
TERRAPIN	165	0.000000	0.423050
TUBER	60	0.000000	2.824660
TUBER	85	0.000000	3.243230
TURKEY	146	0.000000	0.540115
TURKEY	283	0.000000	0.433640
TURKEY	305	0.000000	0.326725
WALNUT	887	0.000000	137.465940
** Total **		8.684933	1540.108054

** MACA-137 PRE-MAIZE GARDENING, SPRING (NO ACORNS OR SQUASH)

AMARANTH GREENS	**44**	**1.966522**	**3.784210**
BEAR	363	0.000000	0.370220
BEAR	440	0.000000	0.276710
BEAR	239	0.000000	0.323480
BEAVER	205	0.000000	0.008570
BEAVER	170	0.000000	0.008570
BEAVER	205	0.000000	0.008570
BOX TURTLE	600	0.000000	0.997694
CHENOPODIUM GREENS	44	0.000000	0.787830
CHENOPODIUM SEEDS	163	0.000000	577.790160
DEER	118	0.000000	1.767090
DEER	97	0.000000	0.406635
DEER	160	0.000000	1.624435
DUCK	4178	0.000000	0.177620
FISH	63	0.000000	30.710150
FISH	**56**	**8.588686**	**30.710150**
GREENS (OTHER)	100	0.000000	1.033880
HAWTHORN	81	0.000000	0.072200
HAZELNUT	1287	0.000000	0.243020
HICKORY	277	0.000000	69.030210
MUSHROOM	110	0.000000	2.615380
MUSKRAT	543	0.000000	0.472240
MUSKRAT	480	0.000000	0.472240
MUSKRAT	543	0.000000	0.472240
OPOSSUM	219	0.000000	0.055730
OPOSSUM	269	0.000000	0.055730
OPOSSUM	289	0.000000	0.055730
PLUM	46	0.000000	1.010780
POKE GREENS	44	0.000000	0.974300
RABBIT	219	0.000000	0.607645
RABBIT	269	0.000000	0.470715
RABBIT	289	0.000000	0.607645
RACCOON	277	0.000000	0.150005
RACCOON	395	0.000000	0.090005
RACCOON	430	0.000000	0.120000
SNAPPING TURTLE	179	0.000000	0.017960

SOFTSHELL TURTLE	274	0.000000	0.015925
SQUIRREL	577	0.000000	0.474680
SQUIRREL	1176	0.000000	0.274980
SQUIRREL	704	0.000000	0.405945
SUNFLOWER	418	0.000000	454.850550
TERRAPIN	165	0.000000	0.423050
TUBER	85	0.000000	2.824660
TUBER	60	0.000000	2.720080
TUBER	85	0.000000	1.778610
TURKEY	181	0.000000	0.540115
TURKEY	248	0.000000	0.433640
TURKEY	216	0.000000	0.540115
WALNUT	897	0.000000	137.465940
** Total **		10.555208	1331.128039

** MACA-137 PRE-MAIZE GARDENING, SUMMER (NO ACORNS OR SQUASH)

AMARANTH GREENS	**44**	**0.330834**	**3.784210**
BEAR	475	0.000000	0.276710
BEAR	416	0.000000	0.292310
BEAR	239	0.000000	0.323480
BEAVER	205	0.000000	0.008570
BEAVER	170	0.000000	0.008570
BEAVER	205	0.000000	0.008570
BERRIES (RUBUS)	65	0.000000	0.072200
BLACK CHERRY	60	0.000000	72.198500
BLUEBERRIES	65	0.000000	0.272150
BOX TURTLE	600	0.000000	0.997694
CHENOPODIUM GREENS	44	0.000000	0.787830
DEER	132	0.000000	0.406635
DEER	96	0.000000	0.412020
DEER	160	0.000000	1.624435
DUCK	4178	0.000000	0.177620
FISH	89	0.000000	30.710150
FISH	**28**	**8.519566**	**30.710150**
GRAPE	28	0.000000	0.463730
GREENS (OTHER)	100	0.000000	0.516940
MUSKRAT	543	0.000000	0.472240
MUSKRAT	480	0.000000	0.472240
MUSKRAT	543	0.000000	0.472240
MUSSEL	**40**	**0.399062**	**116.984290**
OPOSSUM	304	0.000000	0.055730
OPOSSUM	269	0.000000	0.055730
OPOSSUM	289	0.000000	0.055730
RABBIT	304	0.000000	0.470715
RABBIT	269	0.000000	0.470715
RABBIT	289	0.000000	0.607645
RACCOON	430	0.000000	0.090005
RACCOON	378	0.000000	0.094365
RACCOON	430	0.000000	0.120000
SNAPPING TURTLE	179	0.000000	0.017960
SOFTSHELL TURTLE	274	0.000000	0.015925
SQUIRREL	1211	0.000000	0.274980
SQUIRREL	1000	0.000000	0.374530
SQUIRREL	704	0.000000	0.405945
TERRAPIN	165	0.000000	0.423050
TUBER	85	0.000000	2.720080
TUBER	**60**	**0.523150**	**0.523150**
TUBER	85	0.000000	1.778610

TURKEY	283	0.000000	0.433640
TURKEY	290	0.000000	0.326725
TURKEY	216	0.000000	0.540115
** Total **		9.772612	272.308829

** MACA-137 PRE-MAIZE GARDENING, WINTER (NO ACORNS OR SQUASH)

BEAR	363	0.000000	0.370220
BEAR	431	0.000000	0.292310
BEAR	169	0.000000	0.323480
BEAVER	205	0.000000	0.017140
BEAVER	170	0.000000	0.008570
BERRIES (RUBUS)	**81**	**0.072200**	**0.072200**
BLACK CHERRY	**74**	**0.527121**	**72.198500**
BLUEBERRIES	**81**	**0.272150**	**0.272150**
CHENOPODIUM SEEDS	**163**	**3.898944**	**577.790160**
DEER	118	0.000000	1.767090
DEER	111	0.000000	0.412020
DEER	**90**	**0.478028**	**1.624435**
DUCK	4178	0.000000	0.177620
FISH	63	0.000000	61.420300
GRAPE	46	0.000000	0.463730
HAWTHORN	**81**	**0.072200**	**0.072200**
HAZELNUT	1287	0.000000	0.243020
HICKORY	277	0.000000	69.030210
MUSKRAT	543	0.000000	0.944480
MUSKRAT	480	0.000000	0.472240
OPOSSUM	219	0.000000	0.055730
OPOSSUM	284	0.000000	0.055730
OPOSSUM	219	0.000000	0.055730
PLUM	**46**	**1.010780**	**1.010780**
RABBIT	219	0.000000	0.607645
RABBIT	284	0.000000	0.470715
RABBIT	219	0.000000	0.607645
RACCOON	277	0.000000	0.150005
RACCOON	398	0.000000	0.094365
RACCOON	395	0.000000	0.120000
SNAPPING TURTLE	179	0.000000	0.017960
SQUIRREL	577	0.000000	0.474680
SQUIRREL	1015	0.000000	0.374530
SQUIRREL	634	0.000000	0.405945
SUNFLOWER	418	0.000000	454.850550
TUBER	85	0.000000	3.347810
TUBER	60	0.000000	1.778610
TURKEY	181	0.000000	0.540115
TURKEY	305	0.000000	0.326725
TURKEY	146	0.000000	0.540115
WALNUT	897	0.000000	137.465940
** Total **		6.331423	1391.323400

** MACA-137 POST-MAIZE GARDENING, FALL (NO ACORNS OR SQUASH)

BEAR	328	0.000000	0.370220
BEAR	475	0.000000	0.276710
BEAR	431	0.000000	0.292310
BEAVER	170	0.000000	0.008570
BEAVER	205	0.000000	0.017140

BERRIES (RUBUS)	81	0.000000	0.072200
BLACK CHERRY	74	0.000000	72.198500
BLUEBERRIES	81	0.000000	0.272150
BOX TURTLE	600	0.000000	0.997694
CHENOPODIUM SEEDS	153	0.000000	577.790160
DEER	**83**	**1.767090**	**1.767090**
DEER	132	0.000000	0.406635
DEER	111	0.000000	0.412020
DUCK	4178	0.000000	0.177620
FISH	**28**	**5.398231**	**30.710150**
FISH	89	0.000000	30.710150
FISH	63	0.000000	30.710150
GRAPE	46	0.000000	0.463730
HAWTHORN	65	0.000000	0.072200
HAZELNUT	1277	0.000000	0.243020
HICKORY	247	0.000000	69.030210
MAIZE	71	0.000000	1134.180675
MAIZE	84	0.000000	1134.180675
MUSKRAT	480	0.000000	0.472240
MUSKRAT	543	0.000000	0.944480
MUSSEL	**40**	**0.565094**	**116.984290**
OPOSSUM	184	0.000000	0.055730
OPOSSUM	304	0.000000	0.055730
OPOSSUM	284	0.000000	0.055730
PAWPAW	**12**	**0.381010**	**0.381010**
PLUM	**28**	**0.573408**	**1.010780**
RABBIT	184	0.000000	0.607645
RABBIT	304	0.000000	0.470715
RABBIT	284	0.000000	0.470715
RACCOON	242	0.000000	0.150005
RACCOON	430	0.000000	0.090005
RACCOON	398	0.000000	0.094365
SNAPPING TURTLE	179	0.000000	0.017960
SOFTSHELL TURTLE	274	0.000000	0.015925
SQUIRREL	542	0.000000	0.474680
SQUIRREL	1211	0.000000	0.274980
SQUIRREL	1015	0.000000	0.374530
SUNFLOWER	410	0.000000	454.850550
TERRAPIN	165	0.000000	0.423050
TUBER	60	0.000000	2.824660
TUBER	85	0.000000	3.243230
TURKEY	146	0.000000	0.540115
TURKEY	283	0.000000	0.433640
TURKEY	305	0.000000	0.326725
WALNUT	887	0.000000	137.465940
** Total **		8.684833	3808.469404

** MACA-137 POST-MAIZE GARDENING, SPRING (NO ACORNS OR SQUASH)

AMARANTH GREENS	**44**	**2.298642**	**3.784210**
BEAR	363	0.000000	0.370220
BEAR	440	0.000000	0.276710
BEAR	239	0.000000	0.323480
BEAVER	205	0.000000	0.008570
BEAVER	170	0.000000	0.008570
BEAVER	205	0.000000	0.008570
BOX TURTLE	600	0.000000	0.997694
CHENOPODIUM GREENS	44	0.000000	0.787830
CHENOPODIUM SEEDS	163	0.000000	577.790160

DEER	118	0.000000	1.767090
DEER	97	0.000000	0.406635
DEER	160	0.000000	1.624435
DUCK	4178	0.000000	0.177620
FISH	63	0.000000	30.710150
FISH	56	0.000000	30.710150
GREENS (OTHER)	100	0.000000	1.033880
HAWTHORN	81	0.000000	0.072200
HAZELNUT	1287	0.000000	0.243020
HICKORY	277	0.000000	69.030210
MAIZE	**84**	**3.692821**	**1134.180675**
MUSHROOM	110	0.000000	2.615380
MUSKRAT	543	0.000000	0.472240
MUSKRAT	480	0.000000	0.472240
MUSKRAT	543	0.000000	0.472240
OPOSSUM	219	0.000000	0.055730
OPOSSUM	269	0.000000	0.055730
OPOSSUM	289	0.000000	0.055730
PLUM	46	0.000000	1.010780
POKE GREENS	44	0.000000	0.974300
RABBIT	219	0.000000	0.607645
RABBIT	269	0.000000	0.470715
RABBIT	289	0.000000	0.607645
RACCOON	277	0.000000	0.150005
RACCOON	395	0.000000	0.090005
RACCOON	430	0.000000	0.120000
SNAPPING TURTLE	179	0.000000	0.017960
SOFTSHELL TURTLE	274	0.000000	0.015925
SQUIRREL	577	0.000000	0.474680
SQUIRREL	1176	0.000000	0.274980
SQUIRREL	704	0.000000	0.405945
SUNFLOWER	418	0.000000	454.850550
TERRAPIN	165	0.000000	0.423050
TUBER	85	0.000000	2.824660
TUBER	60	0.000000	2.720080
TUBER	85	0.000000	1.778610
TURKEY	181	0.000000	0.540115
TURKEY	248	0.000000	0.433640
TURKEY	216	0.000000	0.540115
WALNUT	897	0.000000	137.465940
** Total **		5.991463	2465.308714

** MACA-137 POST-MAIZE GARDENING, SUMMER (NO ACORNS OR SQUASH)

AMARANTH GREENS	**44**	**0.330834**	**3.784210**
BEAR	475	0.000000	0.276710
BEAR	416	0.000000	0.292310
BEAR	239	0.000000	0.323480
BEAVER	205	0.000000	0.008570
BEAVER	170	0.000000	0.008570
BEAVER	205	0.000000	0.008570
BERRIES (RUBUS)	65	0.000000	0.072200
BLACK CHERRY	60	0.000000	72.198500
BLUEBERRIES	65	0.000000	0.272150
BOX TURTLE	600	0.000000	0.997694
CHENOPODIUM GREENS	44	0.000000	0.787830
DEER	132	0.000000	0.406635
DEER	96	0.000000	0.412020
DEER	160	0.000000	1.624435

DUCK	4178	0.000000	0.177620
FISH	89	0.000000	30.710150
FISH	**28**	**8.519566**	**30.710150**
GRAPE	28	0.000000	0.463730
GREENS (OTHER)	100	0.000000	0.516940
MAIZE	71	0.000000	1134.180675
MUSKRAT	543	0.000000	0.472240
MUSKRAT	480	0.000000	0.472240
MUSKRAT	543	0.000000	0.472240
MUSSEL	**40**	**0.399062**	**116.984290**
OPOSSUM	304	0.000000	0.055730
OPOSSUM	269	0.000000	0.055730
OPOSSUM	289	0.000000	0.055730
RABBIT	304	0.000000	0.470715
RABBIT	269	0.000000	0.470715
RABBIT	289	0.000000	0.607645
RACCOON	430	0.000000	0.090005
RACCOON	378	0.000000	0.094365
RACCOON	430	0.000000	0.120000
SNAPPING TURTLE	179	0.000000	0.017960
SOFTSHELL TURTLE	274	0.000000	0.015925
SQUIRREL	1211	0.000000	0.274980
SQUIRREL	1000	0.000000	0.374530
SQUIRREL	704	0.000000	0.405945
TERRAPIN	165	0.000000	0.423050
TUBER	85	0.000000	2.720080
TUBER	**60**	**0.523150**	**0.523150**
TUBER	85	0.000000	1.778610
TURKEY	283	0.000000	0.433640
TURKEY	290	0.000000	0.326725
TURKEY	216	0.000000	0.540115
** Total **		9.772612	1406.489504

** MACA-137 POST-MAIZE GARDENING, WINTER (NO ACORNS OR SQUASH)

BEAR	363	0.000000	0.370220
BEAR	431	0.000000	0.292310
BEAR	169	0.000000	0.323480
BEAVER	205	0.000000	0.017140
BEAVER	170	0.000000	0.008570
BERRIES (RUBUS)	**81**	**0.072200**	**0.072200**
BLACK CHERRY	**74**	**0.527121**	**72.198500**
BLUEBERRIES	**81**	**0.272150**	**0.272150**
CHENOPODIUM SEEDS	**163**	**3.898944**	**577.790160**
DEER	118	0.000000	1.767090
DEER	111	0.000000	0.412020
DEER	**90**	**0.478028**	**1.624435**
DUCK	4178	0.000000	0.177620
FISH	63	0.000000	61.420300
GRAPE	46	0.000000	0.463730
HAWTHORN	**81**	**0.072200**	**0.072200**
HAZELNUT	1287	0.000000	0.243020
HICKORY	277	0.000000	69.030210
MAIZE	84	0.000000	2268.361350
MUSKRAT	543	0.000000	0.944480
MUSKRAT	480	0.000000	0.472240
OPOSSUM	219	0.000000	0.055730
OPOSSUM	284	0.000000	0.055730
OPOSSUM	219	0.000000	0.055730

PLUM	**46**	**1.010780**	**1.010780**
RABBIT	219	0.000000	0.607645
RABBIT	284	0.000000	0.470715
RABBIT	219	0.000000	0.607645
RACCOON	277	0.000000	0.150005
RACCOON	398	0.000000	0.094365
RACCOON	395	0.000000	0.120000
SNAPPING TURTLE	179	0.000000	0.017960
SQUIRREL	577	0.000000	0.474680
SQUIRREL	1015	0.000000	0.374530
SQUIRREL	634	0.000000	0.405945
SUNFLOWER	418	0.000000	454.850550
TUBER	85	0.000000	3.347810
TUBER	60	0.000000	1.778610
TURKEY	181	0.000000	0.540115
TURKEY	305	0.000000	0.326725
TURKEY	146	0.000000	0.540115
WALNUT	897	0.000000	137.465940
** Total **		6.331423	3659.684750

** MACA-171 FORAGING, FALL (NO ACORNS OR SQUASH)

BEAR	328	0.000000	0.383625
BEAR	475	0.000000	0.286720
BEAR	431	0.000000	0.302890
BEAVER	170	0.000000	0.001165
BEAVER	205	0.000000	0.002330
BERRIES (RUBUS)	81	0.000000	0.025120
BLACK CHERRY	74	0.000000	25.120000
BLUEBERRIES	81	0.000000	0.160590
BOX TURTLE	600	0.000000	1.033807
CHENOPODIUM SEEDS	153	0.000000	201.030340
DEER	**83**	**2.722146**	**2.987070**
DEER	132	0.000000	0.141480
DEER	111	0.000000	0.143355
DUCK	4178	0.000000	0.024115
FISH	**28**	**4.169485**	**4.169485**
FISH	89	0.000000	4.169485
FISH	63	0.000000	4.169485
GRAPE	46	0.000000	0.161350
HAWTHORN	65	0.000000	0.025120
HAZELNUT	1277	0.000000	0.084550
HICKORY	247	0.000000	116.687870
MUSKRAT	480	0.000000	0.064115
MUSKRAT	543	0.000000	0.128230
MUSSEL	**40**	**0.589574**	**15.882830**
OPOSSUM	184	0.000000	0.019390
OPOSSUM	304	0.000000	0.019390
OPOSSUM	284	0.000000	0.019390
PAWPAW	**12**	**0.224830**	**0.224830**
PLUM	28	0.000000	0.351680
RABBIT	184	0.000000	0.629635
RABBIT	304	0.000000	0.487745
RABBIT	284	0.000000	0.487745
RACCOON	242	0.000000	0.052190
RACCOON	430	0.000000	0.031315
RACCOON	398	0.000000	0.032835
SNAPPING TURTLE	179	0.000000	0.002440
SOFTSHELL TURTLE	274	0.000000	0.002160

SQUIRREL	542	0.000000	0.491865
SQUIRREL	1211	0.000000	0.284930
SQUIRREL	1015	0.000000	0.388085
TERRAPIN	165	0.000000	0.057435
TUBER	60	0.000000	0.982780
TUBER	85	0.000000	1.128415
TURKEY	146	0.000000	0.756150
TURKEY	283	0.000000	0.607085
TURKEY	305	0.000000	0.457405
WALNUT	887	0.000000	47.828480
** Total **		7.706035	432.528502

** MACA-171 FORAGING, SPRING (NO ACORNS OR SQUASH)

AMARANTH GREENS	**44**	**1.316640**	**1.316640**
BEAR	363	0.000000	0.383625
BEAR	440	0.000000	0.286720
BEAR	239	0.000000	0.335185
BEAVER	205	0.000000	0.001165
BEAVER	170	0.000000	0.001165
BEAVER	205	0.000000	0.001165
BOX TURTLE	600	0.000000	1.033807
CHENOPODIUM GREENS	**44**	**0.025506**	**0.274110**
CHENOPODIUM SEEDS	**163**	**0.110386**	**201.030340**
DEER	118	0.000000	2.987070
DEER	97	0.000000	0.141480
DEER	160	0.000000	2.745925
DUCK	4178	0.000000	0.024115
FISH	**63**	**4.169485**	**4.169485**
FISH	**56**	**4.169485**	**4.169485**
GREENS (OTHER)	100	0.000000	0.359720
HAWTHORN	81	0.000000	0.025120
HAZELNUT	1287	0.000000	0.084550
HICKORY	277	0.000000	116.687870
MUSHROOM	110	0.000000	4.421000
MUSKRAT	543	0.000000	0.064115
MUSKRAT	480	0.000000	0.064115
MUSKRAT	543	0.000000	0.064115
OPOSSUM	219	0.000000	0.019390
OPOSSUM	269	0.000000	0.019390
OPOSSUM	289	0.000000	0.019390
PLUM	46	0.000000	0.351680
POKE GREENS	**44**	**0.574930**	**0.574930**
RABBIT	219	0.000000	0.629635
RABBIT	269	0.000000	0.487745
RABBIT	289	0.000000	0.629635
RACCOON	277	0.000000	0.052190
RACCOON	395	0.000000	0.031315
RACCOON	430	0.000000	0.041750
SNAPPING TURTLE	179	0.000000	0.002440
SOFTSHELL TURTLE	274	0.000000	0.002160
SQUIRREL	577	0.000000	0.491865
SQUIRREL	1176	0.000000	0.284930
SQUIRREL	704	0.000000	0.420635
TERRAPIN	165	0.000000	0.057435
TUBER	85	0.000000	0.982780
TUBER	60	0.000000	0.946395
TUBER	85	0.000000	0.618830
TURKEY	181	0.000000	0.756150

TURKEY	248	0.000000	0.607085
TURKEY	216	0.000000	0.756150
WALNUT	897	0.000000	47.828480
** Total **		10.366432	397.284472

** MACA-171 FORAGING, SUMMER (NO ACORNS OR SQUASH)

AMARANTH GREENS	44	0.000000	1.316640
BEAR	475	0.000000	0.286720
BEAR	416	0.000000	0.302890
BEAR	**239**	**0.075433**	**0.335185**
BEAVER	205	0.000000	0.001165
BEAVER	170	0.000000	0.001165
BEAVER	205	0.000000	0.001165
BERRIES (RUBUS)	65	0.000000	0.025120
BLACK CHERRY	60	0.000000	25.120000
BLUEBERRIES	65	0.000000	0.160590
BOX TURTLE	600	0.000000	1.033807
CHENOPODIUM GREENS	**44**	**0.166334**	**0.274110**
DEER	132	0.000000	0.141480
DEER	**96**	**0.143355**	**0.143355**
DEER	160	0.000000	2.745925
DUCK	4178	0.000000	0.024115
FISH	**89**	**4.169485**	**4.169485**
FISH	**28**	**4.169485**	**4.169485**
GRAPE	**28**	**0.161350**	**0.161350**
GREENS (OTHER)	100	0.000000	0.179860
MUSKRAT	543	0.000000	0.064115
MUSKRAT	480	0.000000	0.064115
MUSKRAT	543	0.000000	0.064115
MUSSEL	**40**	**0.493438**	**15.882830**
OPOSSUM	304	0.000000	0.019390
OPOSSUM	269	0.000000	0.019390
OPOSSUM	289	0.000000	0.019390
RABBIT	304	0.000000	0.487745
RABBIT	269	0.000000	0.487745
RABBIT	289	0.000000	0.629635
RACCOON	430	0.000000	0.031315
RACCOON	378	0.000000	0.032835
RACCOON	430	0.000000	0.041750
SNAPPING TURTLE	179	0.000000	0.002440
SOFTSHELL TURTLE	274	0.000000	0.002160
SQUIRREL	1211	0.000000	0.284930
SQUIRREL	1000	0.000000	0.388085
SQUIRREL	704	0.000000	0.420635
TERRAPIN	165	0.000000	0.057435
TUBER	85	0.000000	0.946395
TUBER	**60**	**0.182020**	**0.182020**
TUBER	85	0.000000	0.618830
TURKEY	283	0.000000	0.607085
TURKEY	290	0.000000	0.457405
TURKEY	216	0.000000	0.756150
** Total **		9.560900	63.161552

** MACA-171 FORAGING, WINTER (NO ACORNS OR SQUASH)

BEAR	363	0.000000	0.383625

BEAR	431	0.000000	0.302890
BEAR	169	0.000000	0.335185
BEAVER	205	0.000000	0.002330
BEAVER	170	0.000000	0.001165
BERRIES (RUBUS)	**81**	**0.025120**	**0.025120**
BLACK CHERRY	**74**	**1.200014**	**25.120000**
BLUEBERRIES	**81**	**0.160590**	**0.160590**
CHENOPODIUM SEEDS	**163**	**3.894101**	**201.030340**
DEER	118	0.000000	2.987070
DEER	111	0.000000	0.143355
DEER	**90**	**0.677995**	**2.745925**
DUCK	4178	0.000000	0.024115
FISH	63	0.000000	8.338970
GRAPE	46	0.000000	0.161350
HAWTHORN	**81**	**0.025120**	**0.025120**
HAZELNUT	1287	0.000000	0.084550
HICKORY	277	0.000000	116.687870
MUSKRAT	543	0.000000	0.128230
MUSKRAT	480	0.000000	0.064115
OPOSSUM	219	0.000000	0.019390
OPOSSUM	284	0.000000	0.019390
OPOSSUM	219	0.000000	0.019390
PLUM	**46**	**0.351680**	**0.351680**
RABBIT	219	0.000000	0.629635
RABBIT	284	0.000000	0.487745
RABBIT	219	0.000000	0.629635
RACCOON	277	0.000000	0.052190
RACCOON	398	0.000000	0.032835
RACCOON	395	0.000000	0.041750
SNAPPING TURTLE	179	0.000000	0.002440
SQUIRREL	577	0.000000	0.491865
SQUIRREL	1015	0.000000	0.388085
SQUIRREL	634	0.000000	0.420635
TUBER	85	0.000000	1.164800
TUBER	60	0.000000	0.618830
TURKEY	181	0.000000	0.756150
TURKEY	305	0.000000	0.457405
TURKEY	146	0.000000	0.756150
WALNUT	897	0.000000	47.828480
** Total **		6.334620	413.920395

** MACA-171 PRE-MAIZE GARDENING, FALL (NO ACORNS OR SQUASH)

BEAR	328	0.000000	0.383625
BEAR	475	0.000000	0.286720
BEAR	431	0.000000	0.302890
BEAVER	170	0.000000	0.001165
BEAVER	205	0.000000	0.002330
BERRIES (RUBUS)	81	0.000000	0.025120
BLACK CHERRY	74	0.000000	25.120000
BLUEBERRIES	81	0.000000	0.160590
BOX TURTLE	600	0.000000	1.033807
CHENOPODIUM SEEDS	153	0.000000	201.030340
DEER	**83**	**2.722146**	**2.987070**
DEER	132	0.000000	0.141480
DEER	111	0.000000	0.143355
DUCK	4178	0.000000	0.024115
FISH	**28**	**4.169485**	**4.169485**
FISH	89	0.000000	4.169485

FISH	63	0.000000	4.169485
GRAPE	46	0.000000	0.161350
HAWTHORN	65	0.000000	0.025120
HAZELNUT	1277	0.000000	0.084550
HICKORY	247	0.000000	116.687870
MUSKRAT	480	0.000000	0.064115
MUSKRAT	543	0.000000	0.128230
MUSSEL	**40**	**0.589574**	**15.882830**
OPOSSUM	184	0.000000	0.019390
OPOSSUM	304	0.000000	0.019390
OPOSSUM	284	0.000000	0.019390
PAWPAW	**12**	**0.224830**	**0.224830**
PLUM	28	0.000000	0.351680
RABBIT	184	0.000000	0.629635
RABBIT	304	0.000000	0.487745
RABBIT	284	0.000000	0.487745
RACCOON	242	0.000000	0.052190
RACCOON	430	0.000000	0.031315
RACCOON	398	0.000000	0.032835
SNAPPING TURTLE	179	0.000000	0.002440
SOFTSHELL TURTLE	274	0.000000	0.002160
SQUIRREL	542	0.000000	0.491865
SQUIRREL	1211	0.000000	0.284930
SQUIRREL	1015	0.000000	0.388085
SUNFLOWER	410	0.000000	158.256000
TERRAPIN	165	0.000000	0.057435
TUBER	60	0.000000	0.982780
TUBER	85	0.000000	1.128415
TURKEY	146	0.000000	0.756150
TURKEY	283	0.000000	0.607085
TURKEY	305	0.000000	0.457405
WALNUT	887	0.000000	47.828480
** Total **		7.706035	590.784502

** MACA-171 PRE-MAIZE GARDENING, SPRING (NO ACORNS OR SQUASH)

AMARANTH GREENS	**44**	**1.316640**	**1.316640**
BEAR	363	0.000000	0.383625
BEAR	440	0.000000	0.286720
BEAR	239	0.000000	0.335185
BEAVER	205	0.000000	0.001165
BEAVER	170	0.000000	0.001165
BEAVER	205	0.000000	0.001165
BOX TURTLE	600	0.000000	1.033807
CHENOPODIUM GREENS	**44**	**0.025506**	**0.274110**
CHENOPODIUM SEEDS	**163**	**0.110386**	**201.030340**
DEER	118	0.000000	2.987070
DEER	97	0.000000	0.141480
DEER	160	0.000000	2.745925
DUCK	4178	0.000000	0.024115
FISH	**63**	**4.169485**	**4.169485**
FISH	**56**	**4.169485**	**4.169485**
GREENS (OTHER)	100	0.000000	0.359720
HAWTHORN	81	0.000000	0.025120
HAZELNUT	1287	0.000000	0.084550
HICKORY	277	0.000000	116.687870
MUSHROOM	110	0.000000	4.421000
MUSKRAT	543	0.000000	0.064115
MUSKRAT	480	0.000000	0.064115

MUSKRAT	543	0.000000	0.064115
OPOSSUM	219	0.000000	0.019390
OPOSSUM	269	0.000000	0.019390
OPOSSUM	289	0.000000	0.019390
PLUM	46	0.000000	0.351680
POKE GREENS	**44**	**0.574930**	**0.574930**
RABBIT	219	0.000000	0.629635
RABBIT	269	0.000000	0.487745
RABBIT	289	0.000000	0.629635
RACCOON	277	0.000000	0.052190
RACCOON	395	0.000000	0.031315
RACCOON	430	0.000000	0.041750
SNAPPING TURTLE	179	0.000000	0.002440
SOFTSHELL TURTLE	274	0.000000	0.002160
SQUIRREL	577	0.000000	0.491865
SQUIRREL	1176	0.000000	0.284930
SQUIRREL	704	0.000000	0.420635
SUNFLOWER	418	0.000000	158.256000
TERRAPIN	165	0.000000	0.057435
TUBER	85	0.000000	0.982780
TUBER	60	0.000000	0.946395
TUBER	85	0.000000	0.618830
TURKEY	181	0.000000	0.756150
TURKEY	248	0.000000	0.607085
TURKEY	216	0.000000	0.756150
WALNUT	897	0.000000	47.828480
** Total **		10.366432	555.540472

** MACA-171 PRE-MAIZE GARDENING, SUMMER (NO ACORNS OR SQUASH)

AMARANTH GREENS	44	0.000000	1.316640
BEAR	475	0.000000	0.286720
BEAR	416	0.000000	0.302890
BEAR	**239**	**0.075433**	**0.335185**
BEAVER	205	0.000000	0.001165
BEAVER	170	0.000000	0.001165
BEAVER	205	0.000000	0.001165
BERRIES (RUBUS)	65	0.000000	0.025120
BLACK CHERRY	60	0.000000	25.120000
BLUEBERRIES	65	0.000000	0.160590
BOX TURTLE	600	0.000000	1.033807
CHENOPODIUM GREENS	**44**	**0.166334**	**0.274110**
DEER	132	0.000000	0.141480
DEER	**96**	**0.143355**	**0.143355**
DEER	160	0.000000	2.745925
DUCK	4178	0.000000	0.024115
FISH	**89**	**4.169485**	**4.169485**
FISH	**28**	**4.169485**	**4.169485**
GRAPE	**28**	**0.161350**	**0.161350**
GREENS (OTHER)	100	0.000000	0.179860
MUSKRAT	543	0.000000	0.064115
MUSKRAT	480	0.000000	0.064115
MUSKRAT	543	0.000000	0.064115
MUSSEL	**40**	**0.493438**	**15.882830**
OPOSSUM	304	0.000000	0.019390
OPOSSUM	269	0.000000	0.019390
OPOSSUM	289	0.000000	0.019390
RABBIT	304	0.000000	0.487745
RABBIT	269	0.000000	0.487745

RABBIT	289	0.000000	0.629635
RACCOON	430	0.000000	0.031315
RACCOON	378	0.000000	0.032835
RACCOON	430	0.000000	0.041750
SNAPPING TURTLE	179	0.000000	0.002440
SOFTSHELL TURTLE	274	0.000000	0.002160
SQUIRREL	1211	0.000000	0.284930
SQUIRREL	1000	0.000000	0.388085
SQUIRREL	704	0.000000	0.420635
TERRAPIN	165	0.000000	0.057435
TUBER	85	0.000000	0.946395
TUBER	**60**	**0.182020**	**0.182020**
TUBER	85	0.000000	0.618830
TURKEY	283	0.000000	0.607085
TURKEY	290	0.000000	0.457405
TURKEY	216	0.000000	0.756150
** Total **		9.560950	63.161552

** MACA-171 PRE-MAIZE GARDENING, WINTER (NO ACORNS OR SQUASH)

BEAR	363	0.000000	0.383625
BEAR	431	0.000000	0.302890
BEAR	169	0.000000	0.335185
BEAVER	205	0.000000	0.002330
BEAVER	170	0.000000	0.001165
BERRIES (RUBUS)	**81**	**0.025120**	**0.025120**
BLACK CHERRY	**74**	**1.200014**	**25.120000**
BLUEBERRIES	**81**	**0.160590**	**0.160590**
CHENOPODIUM SEEDS	**163**	**3.894101**	**201.030340**
DEER	118	0.000000	2.987070
DEER	111	0.000000	0.143355
DEER	**90**	**0.677995**	**2.745925**
DUCK	4178	0.000000	0.024115
FISH	63	0.000000	8.338970
GRAPE	46	0.000000	0.161350
HAWTHORN	**81**	**0.025120**	**0.025120**
HAZELNUT	1287	0.000000	0.084550
HICKORY	277	0.000000	116.687870
MUSKRAT	543	0.000000	0.128230
MUSKRAT	480	0.000000	0.064115
OPOSSUM	219	0.000000	0.019390
OPOSSUM	284	0.000000	0.019390
OPOSSUM	219	0.000000	0.019390
PLUM	**46**	**0.351680**	**0.351680**
RABBIT	219	0.000000	0.629635
RABBIT	284	0.000000	0.487745
RABBIT	219	0.000000	0.629635
RACCOON	277	0.000000	0.052190
RACCOON	398	0.000000	0.032835
RACCOON	395	0.000000	0.041750
SNAPPING TURTLE	179	0.000000	0.002440
SQUIRREL	577	0.000000	0.491865
SQUIRREL	1015	0.000000	0.388085
SQUIRREL	634	0.000000	0.420635
SUNFLOWER	418	0.000000	158.256000
TUBER	85	0.000000	1.164800
TUBER	60	0.000000	0.618830
TURKEY	181	0.000000	0.756150
TURKEY	305	0.000000	0.457405

TURKEY	146	0.000000	0.756150
WALNUT	897	0.000000	47.828480
** Total **		6.334620	572.176395

** MACA-171 POST-MAIZE GARDENING, FALL (NO ACORNS OR SQUASH)

BEAR	328	0.000000	0.383625
BEAR	475	0.000000	0.286720
BEAR	431	0.000000	0.302890
BEAVER	170	0.000000	0.001165
BEAVER	205	0.000000	0.002330
BERRIES (RUBUS)	81	0.000000	0.025120
BLACK CHERRY	74	0.000000	25.120000
BLUEBERRIES	81	0.000000	0.160590
BOX TURTLE	600	0.000000	1.033807
CHENOPODIUM SEEDS	153	0.000000	201.030340
DEER	**83**	**1.847399**	**2.987070**
DEER	132	0.000000	0.141480
DEER	111	0.000000	0.143355
DUCK	4178	0.000000	0.024115
FISH	**28**	**4.169485**	**4.169485**
FISH	89	0.000000	4.169485
FISH	63	0.000000	4.169485
GRAPE	46	0.000000	0.161350
HAWTHORN	65	0.000000	0.025120
HAZELNUT	1277	0.000000	0.084550
HICKORY	247	0.000000	116.687870
MAIZE	**71**	**0.568503**	**394.615105**
MAIZE	84	0.000000	394.615105
MUSKRAT	480	0.000000	0.064115
MUSKRAT	543	0.000000	0.128230
MUSSEL	**40**	**0.582212**	**15.882830**
OPOSSUM	184	0.000000	0.019390
OPOSSUM	304	0.000000	0.019390
OPOSSUM	284	0.000000	0.019390
PAWPAW	**12**	**0.224830**	**0.224830**
PLUM	**28**	**0.299371**	**0.351680**
RABBIT	184	0.000000	0.629635
RABBIT	304	0.000000	0.487745
RABBIT	284	0.000000	0.487745
RACCOON	242	0.000000	0.052190
RACCOON	430	0.000000	0.031315
RACCOON	398	0.000000	0.032835
SNAPPING TURTLE	179	0.000000	0.002440
SOFTSHELL TURTLE	274	0.000000	0.002160
SQUIRREL	542	0.000000	0.491865
SQUIRREL	1211	0.000000	0.284930
SQUIRREL	1015	0.000000	0.388085
SUNFLOWER	410	0.000000	158.256000
TERRAPIN	165	0.000000	0.057435
TUBER	60	0.000000	0.982780
TUBER	85	0.000000	1.128415
TURKEY	146	0.000000	0.756150
TURKEY	283	0.000000	0.607085
TURKEY	305	0.000000	0.457405
WALNUT	887	0.000000	47.828480
** Total **		7.691800	1380.014712

** MACA-171 POST-MAIZE GARDENING, SPRING (NO ACORNS OR SQUASH)

AMARANTH GREENS	**44**	**1.316640**	**1.316640**
BEAR	363	0.000000	0.383625
BEAR	440	0.000000	0.286720
BEAR	239	0.000000	0.335185
BEAVER	205	0.000000	0.001165
BEAVER	170	0.000000	0.001165
BEAVER	205	0.000000	0.001165
BOX TURTLE	600	0.000000	1.033807
CHENOPODIUM GREENS	**44**	**0.274110**	**0.274110**
CHENOPODIUM SEEDS	**163**	**0.248334**	**201.030340**
DEER	118	0.000000	2.987070
DEER	97	0.000000	0.141480
DEER	160	0.000000	2.745925
DUCK	4178	0.000000	0.024115
FISH	63	0.000000	4.169485
FISH	56	0.000000	4.169485
GREENS (OTHER)	100	0.000000	0.359720
HAWTHORN	81	0.000000	0.025120
HAZELNUT	1287	0.000000	0.084550
HICKORY	277	0.000000	116.687870
MAIZE	**84**	**3.451276**	**394.615105**
MUSHROOM	110	0.000000	4.421000
MUSKRAT	543	0.000000	0.064115
MUSKRAT	480	0.000000	0.064115
MUSKRAT	543	0.000000	0.064115
OPOSSUM	219	0.000000	0.019390
OPOSSUM	269	0.000000	0.019390
OPOSSUM	289	0.000000	0.019390
PLUM	46	0.000000	0.351680
POKE GREENS	**44**	**0.574930**	**0.574930**
RABBIT	219	0.000000	0.629635
RABBIT	269	0.000000	0.487745
RABBIT	289	0.000000	0.629635
RACCOON	277	0.000000	0.052190
RACCOON	395	0.000000	0.031315
RACCOON	430	0.000000	0.041750
SNAPPING TURTLE	179	0.000000	0.002440
SOFTSHELL TURTLE	274	0.000000	0.002160
SQUIRREL	577	0.000000	0.491865
SQUIRREL	1176	0.000000	0.284930
SQUIRREL	704	0.000000	0.420635
SUNFLOWER	418	0.000000	158.256000
TERRAPIN	165	0.000000	0.057435
TUBER	85	0.000000	0.982780
TUBER	60	0.000000	0.946395
TUBER	85	0.000000	0.618830
TURKEY	181	0.000000	0.756150
TURKEY	248	0.000000	0.607085
TURKEY	216	0.000000	0.756150
WALNUT	897	0.000000	47.828480
** Total **		5.865290	950.155577

** MACA-171 POST-MAIZE GARDENING, SUMMER (NO ACORNS OR SQUASH)

AMARANTH GREENS	**44**	**0.079510**	**1.316640**
BEAR	475	0.000000	0.286720

BEAR	416	0.000000	0.302890
BEAR	239	0.000000	0.335185
BEAVER	205	0.000000	0.001165
BEAVER	170	0.000000	0.001165
BEAVER	205	0.000000	0.001165
BERRIES (RUBUS)	65	0.000000	0.025120
BLACK CHERRY	60	0.000000	25.120000
BLUEBERRIES	65	0.000000	0.160590
BOX TURTLE	600	0.000000	1.033807
CHENOPODIUM GREENS	44	0.000000	0.274110
DEER	132	0.000000	0.141480
DEER	96	0.000000	0.143355
DEER	160	0.000000	2.745925
DUCK	4178	0.000000	0.024115
FISH	89	0.000000	4.169485
FISH	**28**	**4.169485**	**4.169485**
GRAPE	**28**	**0.161350**	**0.161350**
GREENS (OTHER)	100	0.000000	0.179860
MAIZE	**71**	**2.278081**	**394.615105**
MUSKRAT	543	0.000000	0.064115
MUSKRAT	480	0.000000	0.064115
MUSKRAT	543	0.000000	0.064115
MUSSEL	**40**	**6.610891**	**15.882830**
OPOSSUM	304	0.000000	0.019390
OPOSSUM	269	0.000000	0.019390
OPOSSUM	289	0.000000	0.019390
RABBIT	304	0.000000	0.487745
RABBIT	269	0.000000	0.487745
RABBIT	289	0.000000	0.629635
RACCOON	430	0.000000	0.031315
RACCOON	378	0.000000	0.032835
RACCOON	430	0.000000	0.041750
SNAPPING TURTLE	179	0.000000	0.002440
SOFTSHELL TURTLE	274	0.000000	0.002160
SQUIRREL	1211	0.000000	0.284930
SQUIRREL	1000	0.000000	0.388085
SQUIRREL	704	0.000000	0.420635
TERRAPIN	165	0.000000	0.057435
TUBER	85	0.000000	0.946395
TUBER	60	0.000000	0.182020
TUBER	85	0.000000	0.618830
TURKEY	283	0.000000	0.607085
TURKEY	290	0.000000	0.457405
TURKEY	216	0.000000	0.756150
** Total **		13.299317	457.776657

** MACA-171 POST-MAIZE GARDENING, WINTER (NO ACORNS OR SQUASH)

BEAR	363	0.000000	0.383625
BEAR	431	0.000000	0.302890
BEAR	169	0.000000	0.335185
BEAVER	205	0.000000	0.002330
BEAVER	170	0.000000	0.001165
BERRIES (RUBUS)	**81**	**0.025120**	**0.025120**
BLACK CHERRY	**74**	**1.200014**	**25.120000**
BLUEBERRIES	**81**	**0.160590**	**0.160590**
CHENOPODIUM SEEDS	**163**	**3.894101**	**201.030340**
DEER	118	0.000000	2.987070
DEER	111	0.000000	0.143355

DEER	**90**	**0.677995**	**2.745925**
DUCK	4178	0.000000	0.024115
FISH	63	0.000000	8.338970
GRAPE	46	0.000000	0.161350
HAWTHORN	**81**	**0.025120**	**0.025120**
HAZELNUT	1287	0.000000	0.084550
HICKORY	277	0.000000	116.687870
MAIZE	84	0.000000	789.230210
MUSKRAT	543	0.000000	0.128230
MUSKRAT	480	0.000000	0.064115
OPOSSUM	219	0.000000	0.019390
OPOSSUM	284	0.000000	0.019390
OPOSSUM	219	0.000000	0.019390
PLUM	**46**	**0.351680**	**0.351680**
RABBIT	219	0.000000	0.629635
RABBIT	284	0.000000	0.487745
RABBIT	219	0.000000	0.629635
RACCOON	277	0.000000	0.052190
RACCOON	398	0.000000	0.032835
RACCOON	395	0.000000	0.041750
SNAPPING TURTLE	179	0.000000	0.002440
SQUIRREL	577	0.000000	0.491865
SQUIRREL	1015	0.000000	0.388085
SQUIRREL	634	0.000000	0.420635
SUNFLOWER	418	0.000000	158.256000
TUBER	85	0.000000	1.164800
TUBER	60	0.000000	0.618830
TURKEY	181	0.000000	0.756150
TURKEY	305	0.000000	0.457405
TURKEY	146	0.000000	0.756150
WALNUT	897	0.000000	47.828480
** Total **		6.334620	1361.406605

** MACA-000 FORAGING, FALL (NO ACORNS OR SQUASH)

BEAR	328	0.000000	0.385735
BEAR	475	0.000000	0.288295
BEAR	431	0.000000	0.304550
BERRIES (RUBUS)	**81**	**0.077050**	**0.077050**
BLACK CHERRY	74	0.000000	77.045000
BLUEBERRIES	**81**	**0.161251**	**0.406290**
BOX TURTLE	600	0.000000	1.039474
CHENOPODIUM SEEDS	**153**	**3.893828**	**616.575730**
DEER	**83**	**0.999465**	**0.999465**
DEER	**132**	**0.077981**	**0.433930**
DEER	**111**	**0.439680**	**0.439680**
GRAPE	46	0.000000	0.494860
HAWTHORN	**65**	**0.077050**	**0.077050**
HAZELNUT	1277	0.000000	0.259330
HICKORY	247	0.000000	39.043320
OPOSSUM	184	0.000000	0.059470
OPOSSUM	304	0.000000	0.059470
OPOSSUM	284	0.000000	0.059470
PAWPAW	**12**	**0.568810**	**0.568810**
PLUM	**28**	**1.078630**	**1.078630**
RABBIT	184	0.000000	0.633095
RABBIT	304	0.000000	0.490425
RABBIT	284	0.000000	0.490425
RACCOON	242	0.000000	0.160075

RACCOON	430	0.000000	0.096045
RACCOON	398	0.000000	0.100700
SQUIRREL	542	0.000000	0.494560
SQUIRREL	1211	0.000000	0.286495
SQUIRREL	1015	0.000000	0.390215
TUBER	60	0.000000	3.014270
TUBER	85	0.000000	3.460940
TURKEY	146	0.000000	0.364090
TURKEY	283	0.000000	0.292315
TURKEY	305	0.000000	0.220245
WALNUT	887	0.000000	146.693680
** Total **		7.373745	896.883184

** MACA-000 FORAGING, SPRING (NO ACORNS OR SQUASH)

AMARANTH GREENS	**44**	**0.410049**	**4.038240**
BEAR	363	0.000000	0.385735
BEAR	440	0.000000	0.288295
BEAR	239	0.000000	0.337030
BOX TURTLE	600	0.000000	1.039474
CHENOPODIUM GREENS	44	0.000000	0.840720
CHENOPODIUM SEEDS	**163**	**3.538363**	**616.575730**
DEER	**118**	**0.347419**	**0.999465**
DEER	97	0.000000	0.433930
DEER	160	0.000000	0.918775
GREENS (OTHER)	100	0.000000	1.103280
HAWTHORN	81	0.000000	0.077050
HAZELNUT	1287	0.000000	0.259330
HICKORY	277	0.000000	39.043320
MUSHROOM	110	0.000000	1.479250
OPOSSUM	219	0.000000	0.059470
OPOSSUM	269	0.000000	0.059470
OPOSSUM	289	0.000000	0.059470
PLUM	46	0.000000	1.078630
POKE GREENS	44	0.000000	1.454520
RABBIT	219	0.000000	0.633095
RABBIT	269	0.000000	0.490425
RABBIT	289	0.000000	0.633095
RACCOON	277	0.000000	0.160075
RACCOON	395	0.000000	0.096045
RACCOON	430	0.000000	0.128055
SQUIRREL	577	0.000000	0.494560
SQUIRREL	1176	0.000000	0.286495
SQUIRREL	704	0.000000	0.422945
TUBER	85	0.000000	3.014270
TUBER	60	0.000000	2.902670
TUBER	85	0.000000	1.898005
TURKEY	181	0.000000	0.364090
TURKEY	248	0.000000	0.292315
TURKEY	216	0.000000	0.364090
WALNUT	897	0.000000	146.693680
** Total **		4.295831	829.405094

** MACA-000 FORAGING, SUMMER (NO ACORNS OR SQUASH)

AMARANTH GREENS	**44**	**0.216011**	**4.038240**
BEAR	475	0.000000	0.288295

BEAR	416	0.000000	0.304550
BEAR	239	0.000000	0.337030
BERRIES (RUBUS)	65	0.000000	0.077050
BLACK CHERRY	**60**	**13.080628**	**77.045000**
BLUEBERRIES	**65**	**0.406290**	**0.406290**
BOX TURTLE	600	0.000000	1.039474
CHENOPODIUM GREENS	**44**	**0.840720**	**0.840720**
DEER	132	0.000000	0.433930
DEER	96	0.439680	0.439680
DEER	**160**	**0.918775**	**0.918775**
GRAPE	**28**	**0.494860**	**0.494860**
GREENS (OTHER)	100	0.000000	0.551640
OPOSSUM	304	0.000000	0.059470
OPOSSUM	269	0.000000	0.059470
OPOSSUM	289	0.000000	0.059470
RABBIT	304	0.000000	0.490425
RABBIT	269	0.000000	0.490425
RABBIT	289	0.000000	0.633095
RACCOON	430	0.000000	0.096045
RACCOON	378	0.000000	0.100700
RACCOON	430	0.000000	0.128055
SQUIRREL	1211	0.000000	0.286495
SQUIRREL	1000	0.000000	0.390215
SQUIRREL	704	0.000000	0.422945
TUBER	85	0.000000	2.902670
TUBER	60	0.000000	0.558270
TUBER	85	0.000000	1.898005
TURKEY	283	0.000000	0.292315
TURKEY	290	0.000000	0.220245
TURKEY	**216**	**0.364090**	**0.364090**
** Total **		16.761054	96.667939

** MACA-000 FORAGING, WINTER (NO ACORNS OR SQUASH)

BEAR	363	0.000000	0.385735
BEAR	431	0.000000	0.304550
BEAR	169	0.000000	0.337030
BERRIES (RUBUS)	**81**	**0.077050**	**0.077050**
BLACK CHERRY	**74**	**0.197442**	**77.045000**
BLUEBERRIES	**81**	**0.406290**	**0.406290**
CHENOPODIUM SEEDS	**163**	**3.921412**	**616.575730**
DEER	118	0.000000	0.999465
DEER	111	0.000000	0.439680
DEER	**90**	**0.468052**	**0.918775**
GRAPE	46	0.000000	0.494860
HAWTHORN	**81**	**0.077050**	**0.077050**
HAZELNUT	1287	0.000000	0.259330
HICKORY	277	0.000000	39.043320
OPOSSUM	219	0.000000	0.059470
OPOSSUM	284	0.000000	0.059470
OPOSSUM	219	0.000000	0.059470
PLUM	**46**	**1.078630**	**1.078630**
RABBIT	219	0.000000	0.633095
RABBIT	284	0.000000	0.490425
RABBIT	219	0.000000	0.633095
RACCOON	277	0.000000	0.160075
RACCOON	398	0.000000	0.100700
RACCOON	395	0.000000	0.128055
SQUIRREL	577	0.000000	0.494560

SQUIRREL	1015	0.000000	0.390215
SQUIRREL	634	0.000000	0.422945
TUBER	85	0.000000	3.572540
TUBER	60	0.000000	1.898005
TURKEY	181	0.000000	0.364090
TURKEY	305	0.000000	0.220245
TURKEY	146	0.000000	0.364090
WALNUT	897	0.000000	146.693680
** Total **		6.225926	895.186720

** MACA-000 PRE-MAIZE GARDENING, FALL (NO ACORNS OR SQUASH)

BEAR	328	0.000000	0.385735
BEAR	475	0.000000	0.288295
BEAR	431	0.000000	0.304550
BERRIES (RUBUS)	**81**	**0.077050**	**0.077050**
BLACK CHERRY	74	0.000000	77.045000
BLUEBERRIES	**81**	**0.161251**	**0.406290**
BOX TURTLE	600	0.000000	1.039474
CHENOPODIUM SEEDS	**153**	**3.893828**	**616.575730**
DEER	**83**	**0.999465**	**0.999465**
DEER	**132**	**0.077981**	**0.433930**
DEER	**111**	**0.439680**	**0.439680**
GRAPE	46	0.000000	0.494860
HAWTHORN	**65**	**0.077050**	**0.077050**
HAZELNUT	1277	0.000000	0.259330
HICKORY	247	0.000000	39.043320
OPOSSUM	184	0.000000	0.059470
OPOSSUM	304	0.000000	0.059470
OPOSSUM	284	0.000000	0.059470
PAWPAW	**12**	**0.568810**	**0.568810**
PLUM	**28**	**1.078630**	**1.078630**
RABBIT	184	0.000000	0.633095
RABBIT	304	0.000000	0.490425
RABBIT	284	0.000000	0.490425
RACCOON	242	0.000000	0.160075
RACCOON	430	0.000000	0.096045
RACCOON	398	0.000000	0.100700
SQUIRREL	542	0.000000	0.494560
SQUIRREL	1211	0.000000	0.286495
SQUIRREL	1015	0.000000	0.390215
SUNFLOWER	410	0.000000	485.383500
TUBER	60	0.000000	3.014270
TUBER	85	0.000000	3.460940
TURKEY	146	0.000000	0.364090
TURKEY	283	0.000000	0.292315
TURKEY	305	0.000000	0.220245
WALNUT	887	0.000000	146.693680
** Total **		7.373745	1382.266684

** MACA-000 PRE-MAIZE GARDENING, SPRING (NO ACORNS OR SQUASH)

AMARANTH GREENS	**44**	**0.410049**	**4.038240**
BEAR	363	0.000000	0.385735
BEAR	440	0.000000	0.288295
BEAR	239	0.000000	0.337030
BOX TURTLE	600	0.000000	1.039474

CHENOPODIUM GREENS	44	0.000000	0.840720
CHENOPODIUM SEEDS	**163**	**3.538363**	**616.575730**
DEER	**118**	**0.347419**	**0.999465**
DEER	97	0.000000	0.433930
DEER	160	0.000000	0.918775
GREENS (OTHER)	100	0.000000	1.103280
HAWTHORN	81	0.000000	0.077050
HAZELNUT	1287	0.000000	0.259330
HICKORY	277	0.000000	39.043320
MUSHROOM	110	0.000000	1.479250
OPOSSUM	219	0.000000	0.059470
OPOSSUM	269	0.000000	0.059470
OPOSSUM	289	0.000000	0.059470
PLUM	46	0.000000	1.078630
POKE GREENS	44	0.000000	1.454520
RABBIT	219	0.000000	0.633095
RABBIT	269	0.000000	0.490425
RABBIT	289	0.000000	0.633095
RACCOON	277	0.000000	0.160075
RACCOON	395	0.000000	0.096045
RACCOON	430	0.000000	0.128055
SQUIRREL	577	0.000000	0.494560
SQUIRREL	1176	0.000000	0.286495
SQUIRREL	704	0.000000	0.422945
SUNFLOWER	418	0.000000	485.383500
TUBER	85	0.000000	3.014270
TUBER	60	0.000000	2.902670
TUBER	85	0.000000	1.898005
TURKEY	181	0.000000	0.364090
TURKEY	248	0.000000	0.292315
TURKEY	216	0.000000	0.364090
WALNUT	897	0.000000	146.693680
** Total **		4.295831	1314.788594

** MACA-000 PRE-MAIZE GARDENING, SUMMER (NO ACORNS OR SQUASH)

AMARANTH GREENS	**44**	**0.216011**	**4.038240**
BEAR	475	0.000000	0.288295
BEAR	416	0.000000	0.304550
BEAR	239	0.000000	0.337030
BERRIES (RUBUS)	65	0.000000	0.077050
BLACK CHERRY	**60**	**13.080628**	**77.045000**
BLUEBERRIES	**65**	**0.406290**	**0.406290**
BOX TURTLE	600	0.000000	1.039474
CHENOPODIUM GREENS	**44**	**0.840720**	**0.840720**
DEER	132	0.000000	0.433930
DEER	**96**	**0.439680**	**0.439680**
DEER	**160**	**0.918775**	**0.918775**
GRAPE	**28**	**0.494860**	**0.494860**
GREENS (OTHER)	100	0.000000	0.551640
OPOSSUM	304	0.000000	0.059470
OPOSSUM	269	0.000000	0.059470
OPOSSUM	289	0.000000	0.059470
RABBIT	304	0.000000	0.490425
RABBIT	269	0.000000	0.490425
RABBIT	289	0.000000	0.633095
RACCOON	430	0.000000	0.096045
RACCOON	378	0.000000	0.100700
RACCOON	430	0.000000	0.128055

SQUIRREL	1211	0.000000	0.286495
SQUIRREL	1000	0.000000	0.390215
SQUIRREL	704	0.000000	0.422945
TUBER	85	0.000000	2.902670
TUBER	60	0.000000	0.558270
TUBER	85	0.000000	1.898005
TURKEY	283	0.000000	0.292315
TURKEY	290	0.000000	0.220245
TURKEY	**216**	**0.364090**	**0.364090**
** Total **		16.761054	96.667939

** MACA-000 PRE-MAIZE GARDENING, WINTER (NO ACORNS OR SQUASH)

BEAR	363	0.000000	0.385735
BEAR	431	0.000000	0.304550
BEAR	169	0.000000	0.337030
BERRIES (RUBUS)	**81**	**0.077050**	**0.077050**
BLACK CHERRY	**74**	**0.197442**	**77.045000**
BLUEBERRIES	**81**	**0.406290**	**0.406290**
CHENOPODIUM SEEDS	**163**	**3.921412**	**616.575730**
DEER	118	0.000000	0.999465
DEER	111	0.000000	0.439680
DEER	**90**	**0.468052**	**0.918775**
GRAPE	46	0.000000	0.494860
HAWTHORN	**81**	**0.077050**	**0.077050**
HAZELNUT	1287	0.000000	0.259330
HICKORY	277	0.000000	39.043320
OPOSSUM	219	0.000000	0.059470
OPOSSUM	284	0.000000	0.059470
OPOSSUM	219	0.000000	0.059470
PLUM	**46**	**1.078630**	**1.078630**
RABBIT	219	0.000000	0.633095
RABBIT	284	0.000000	0.490425
RABBIT	219	0.000000	0.633095
RACCOON	277	0.000000	0.160075
RACCOON	398	0.000000	0.100700
RACCOON	395	0.000000	0.128055
SQUIRREL	577	0.000000	0.494560
SQUIRREL	1015	0.000000	0.390215
SQUIRREL	634	0.000000	0.422945
SUNFLOWER	418	0.000000	485.383500
TUBER	85	0.000000	3.572540
TUBER	60	0.000000	1.898005
TURKEY	181	0.000000	0.364090
TURKEY	305	0.000000	0.220245
TURKEY	146	0.000000	0.364090
WALNUT	897	0.000000	146.693680
** Total **		6.225926	1380.570220

** MACA-000 POST-MAIZE GARDENING, FALL (NO ACORNS OR SQUASH)

BEAR	328	0.000000	0.385735
BEAR	475	0.000000	0.288295
BEAR	431	0.000000	0.304550
BERRIES (RUBUS)	**81**	**0.077050**	**0.077050**
BLACK CHERRY	74	0.000000	77.045000
BLUEBERRIES	**81**	**0.161251**	**0.406290**

BOX TURTLE	600	0.000000	1.039474
CHENOPODIUM SEEDS	**153**	**3.893828**	**616.575730**
DEER	**83**	**0.999465**	**0.999465**
DEER	**132**	**0.077981**	**0.433930**
DEER	**111**	**0.439680**	**0.439680**
GRAPE	46	0.000000	0.494860
HAWTHORN	**65**	**0.077050**	**0.077050**
HAZELNUT	1277	0.000000	0.259330
HICKORY	247	0.000000	39.043320
MAIZE	71	0.000000	1210.315315
MAIZE	84	0.000000	1210.315315
OPOSSUM	184	0.000000	0.059470
OPOSSUM	304	0.000000	0.059470
OPOSSUM	284	0.000000	0.059470
PAWPAW	**12**	**0.568810**	**0.568810**
PLUM	**28**	**1.078630**	**1.078630**
RABBIT	184	0.000000	0.633095
RABBIT	304	0.000000	0.490425
RABBIT	284	0.000000	0.490425
RACCOON	242	0.000000	0.160075
RACCOON	430	0.000000	0.096045
RACCOON	398	0.000000	0.100700
SQUIRREL	542	0.000000	0.494560
SQUIRREL	1211	0.000000	0.286495
SQUIRREL	1015	0.000000	0.390215
SUNFLOWER	410	0.000000	485.383500
TUBER	60	0.000000	3.014270
TUBER	85	0.000000	3.460940
TURKEY	146	0.000000	0.364090
TURKEY	283	0.000000	0.292315
TURKEY	305	0.000000	0.220245
WALNUT	887	0.000000	146.693680
** Total **		7.373745	3802.897314

** MACA-000 POST-MAIZE GARDENING, SPRING (NO ACORNS OR SQUASH)

AMARANTH GREENS	**44**	**2.298642**	**4.038240**
BEAR	363	0.000000	0.385735
BEAR	440	0.000000	0.288295
BEAR	239	0.000000	0.337030
BOX TURTLE	600	0.000000	1.039474
CHENOPODIUM GREENS	44	0.000000	0.840720
CHENOPODIUM SEEDS	163	0.000000	616.575730
DEER	118	0.000000	0.999465
DEER	97	0.000000	0.433930
DEER	160	0.000000	0.918775
GREENS (OTHER)	100	0.000000	1.103280
HAWTHORN	81	0.000000	0.077050
HAZELNUT	1287	0.000000	0.259330
HICKORY	277	0.000000	39.043320
MAIZE	**84**	**3.692821**	**1210.315315**
MUSHROOM	110	0.000000	1.479250
OPOSSUM	219	0.000000	0.059470
OPOSSUM	269	0.000000	0.059470
OPOSSUM	289	0.000000	0.059470
PLUM	46	0.000000	1.078630
POKE GREENS	44	0.000000	1.454520
RABBIT	219	0.000000	0.633095
RABBIT	269	0.000000	0.490425

RABBIT	289	0.000000	0.633095
RACCOON	277	0.000000	0.160075
RACCOON	395	0.000000	0.096045
RACCOON	430	0.000000	0.128055
SQUIRREL	577	0.000000	0.494560
SQUIRREL	1176	0.000000	0.286495
SQUIRREL	704	0.000000	0.422945
SUNFLOWER	418	0.000000	485.383500
TUBER	85	0.000000	3.014270
TUBER	60	0.000000	2.902670
TUBER	85	0.000000	1.898005
TURKEY	181	0.000000	0.364090
TURKEY	248	0.000000	0.292315
TURKEY	216	0.000000	0.364090
WALNUT	897	0.000000	146.693680
** Total **		5.991463	2525.103909

** MACA-000 POST-MAIZE GARDENING, SUMMER (NO ACORNS OR SQUASH)

AMARANTH GREENS	**44**	**1.498595**	**4.038240**
BEAR	475	0.000000	0.288295
BEAR	416	0.000000	0.304550
BEAR	239	0.000000	0.337030
BERRIES (RUBUS)	65	0.000000	0.077050
BLACK CHERRY	60	0.000000	77.045000
BLUEBERRIES	**65**	**0.406290**	**0.406290**
BOX TURTLE	600	0.000000	1.039474
CHENOPODIUM GREENS	**44**	**0.840720**	**0.840720**
DEER	132	0.000000	0.433930
DEER	96	0.000000	0.439680
DEER	160	0.000000	0.918775
GRAPE	**28**	**0.494860**	**0.494860**
GREENS (OTHER)	100	0.000000	0.551640
MAIZE	**71**	**10.365631**	**1210.315315**
OPOSSUM	304	0.000000	0.059470
OPOSSUM	269	0.000000	0.059470
OPOSSUM	289	0.000000	0.059470
RABBIT	304	0.000000	0.490425
RABBIT	269	0.000000	0.490425
RABBIT	289	0.000000	0.633095
RACCOON	430	0.000000	0.096045
RACCOON	378	0.000000	0.100700
RACCOON	430	0.000000	0.128055
SQUIRREL	1211	0.000000	0.286495
SQUIRREL	1000	0.000000	0.390215
SQUIRREL	704	0.000000	0.422945
TUBER	85	0.000000	2.902670
TUBER	60	0.000000	0.558270
TUBER	85	0.000000	1.898005
TURKEY	283	0.000000	0.292315
TURKEY	290	0.000000	0.220245
TURKEY	**216**	**0.364090**	**0.364090**
** Total **		13.970186	1306.983254

** MACA-000 POST-MAIZE GARDENING, WINTER (NO ACORNS OR SQUASH)

BEAR	363	0.000000	0.385735

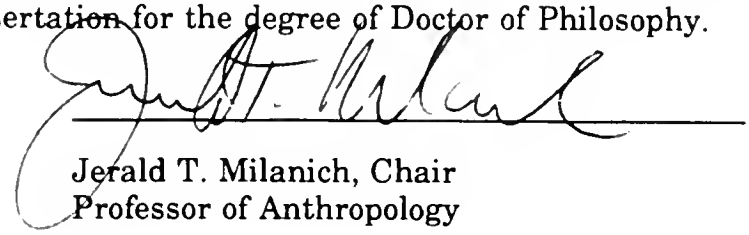
BEAR	431	0.000000	0.304550
BEAR	169	0.000000	0.337030
BERRIES (RUBUS)	**81**	**0.077050**	**0.077050**
BLACK CHERRY	**74**	**0.197442**	**77.045000**
BLUEBERRIES	**81**	**0.406290**	**0.406290**
CHENOPODIUM SEEDS	**163**	**3.921412**	**616.575730**
DEER	118	0.000000	0.999465
DEER	111	0.000000	0.439680
DEER	**90**	**0.468052**	**0.918775**
GRAPE	46	0.000000	0.494860
HAWTHORN	**81**	**0.077050**	**0.077050**
HAZELNUT	1287	0.000000	0.259330
HICKORY	277	0.000000	39.043320
MAIZE	84	0.000000	2420.630630
OPOSSUM	219	0.000000	0.059470
OPOSSUM	284	0.000000	0.059470
OPOSSUM	219	0.000000	0.059470
PLUM	**46**	**1.078630**	**1.078630**
RABBIT	219	0.000000	0.633095
RABBIT	284	0.000000	0.490425
RABBIT	219	0.000000	0.633095
RACCOON	277	0.000000	0.160075
RACCOON	398	0.000000	0.100700
RACCOON	395	0.000000	0.128055
SQUIRREL	577	0.000000	0.494560
SQUIRREL	1015	0.000000	0.390215
SQUIRREL	634	0.000000	0.422945
SUNFLOWER	418	0.000000	485.383500
TUBER	85	0.000000	3.572540
TUBER	60	0.000000	1.898005
TURKEY	181	0.000000	0.364090
TURKEY	305	0.000000	0.220245
TURKEY	146	0.000000	0.364090
WALNUT	897	0.000000	146.693680
** Total **		6.225926	3801.200850

BIOGRAPHICAL SKETCH

The author was born on June 1st, 1954, in Bosier City, Louisiana to Harold L. Prentice and Margaret A. Prentice (*nee* Kidd) while his father was with the Air Force. The eldest of five children, Guy Prentice spent all but the first two years of his childhood in his mother's home town of Troy Grove, Illinois, population 287 and birth place of Wild Bill Hickock. The first six years of school were spent in a three-room grade school in Troy Grove. Summers were spent exploring and playing in the nearby woods and streams. The last two years of grade school were spent at Northbrook Grade School in Mendota, Illinois, as a result of school consolidation. In 1972, Guy graduated from Mendota High School, Mendota, Illinois, and later the same year began college at the University of Illinois, Urbana. After receiving his B.A. in anthropology at the University of Illinois in 1976, Guy worked for the University of Illinois as an archaeologist on the FAI-270 Project. In 1983, he returned to school at the University of Florida, Gainesville to pursue a Ph.D. In 1986, after completing all required courses for graduation, but having expended all financial options available at the University, Guy took a job with the National Park Service, Southeast Archeological Center, Tallahassee, Florida. While employed with the Park Service, Guy was offered the job of

Project Director for the Mammoth Cave National Park Archeological Inventory Project, which provided the opportunity to gather the data used in his dissertation. It also provided the circumstances which led to the meeting between Guy and Marie C. Mathison, whom he married on October 28, 1989. On March 31, 1993, Marie gave birth to a son, Daniel Louis Prentice. Life has been very good so far.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

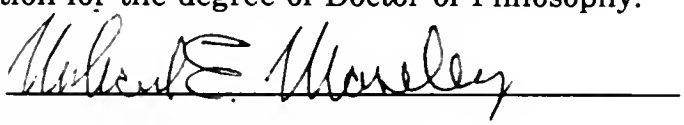


Jerald T. Milanich, Chair
Professor of Anthropology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

William H. Marquardt
Professor of Anthropology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.



Michael E. Moseley
Professor of Anthropology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

John R. Dunkle
Professor of Geography

This dissertation was submitted to the Graduate Faculty of the Department of Anthropology in the College of Liberal Arts and Sciences and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

April 1994

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Dean, Graduate School

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